THE THIRD PENGUIN
PROBLEMS BOOK

(540)

THE THIRD PENGUIN PROBLEMS BOOK

by

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and

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INFERENTIAL AND MATHEMATICAL PROBLEMS

FOREWORD

THE present volume differs from its predecessors in one respect : a sprinkling of easier problems has been included for the benefit of those readers who lamented their inability to cope with many items that interested them in the First and Second Problems Books. At the same time, the "stalwarts" will find a plentiful supply of the tougher fare that their taste demands.

We again tender our sincere thanks to Messrs. George Newnes, Ltd., for their kind permission to reprint much of our work that has appeared in *The Strand Magazine* and in *John o' London's Weekly;* and to one or two readers of the latter journal who occasionally contributed Word and Letter problems for its competition column.

W. T. W.
G. H. S.

INFERENTIAL AND MATHEMATICAL PROBLEMS

1. EVERY LITTLE HELPS

MEMBERS of the Popplevalve Polishers' Association were invited, when paying their modest annual subscription, which is less than two pounds, to enclose an additional penny for the P.P.A. Spitfire Fund. All but one complied with this suggestion, the total sum received by the Treasurer being eight hundred and seventy pounds five shillings.

How much of this went to the Spitfire Fund?

2. A MIXED BAG

FOUR comrades had brought in five prisoners—a German, an Italian, a Rumanian, a Spaniard and a Hungarian —and, having labelled each with a different letter, they made the following statements to the Commissar. Each, I regret to say, made only one correct statement.

Fibkin : A is not Spanish, B is not German, C is Italian.

Leisky : D is Spanish, B is not Rumanian, C is not Hungarian.

Notzo : E is not Rumanian, A is German, D is not Italian.

Truthizov : B is Hungarian, E is not Italian, C is not German.

Assign correct nationalities to A, B, C, D and E.

3. MR. BRISTLING SEES THROUGH IT

YOUNG Bristling, having annexed a sheet of paper nearly ten inches square from his father's writing-table,

proceeded to cut from it an L-shaped figure; the diagram, which is not to scale, shows the sort of thing it was. The parts A and B are unequal squares, and C a rectangle.
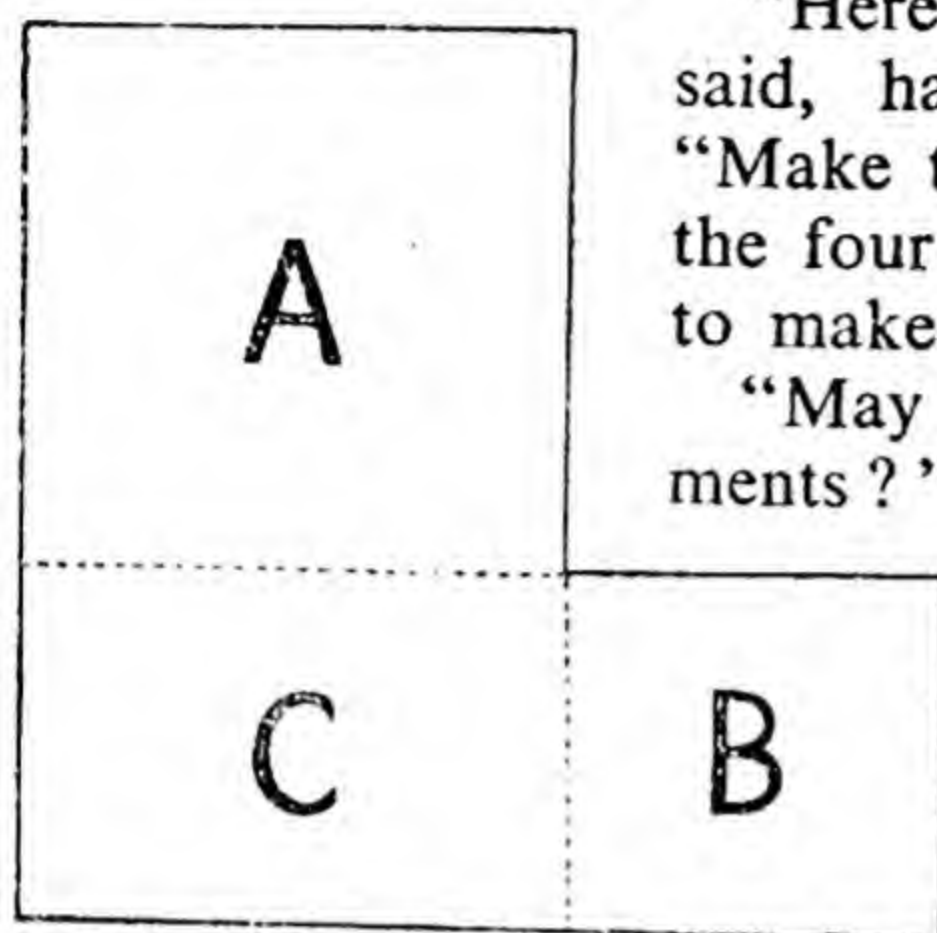
"Here you are, Skipper," he said, handing it to his father. "Make three straight cuts so that the four bits can be put together to make a square."

"May I make some measurements?" asked Mr. Bristling.

"Well, yes, if you like," said his son. "It makes it a bit easy, though. You'll find that each side of the figure, and of the resulting square, is a whole number of inches."

Mr. Bristling easily solved the problem; so, to stiffen it a little for our readers, we are not disclosing the measurements. What were they, and how were the cuts made?

4. FLUTTERBY'S GRANDFATHER

Flutterby's grandfather died in 1872. Flutterby died one hundred and thirty-one years after his grandfather was born. Their ages add up to one hundred and five years. When was Flutterby born?

5. YOUNG SAVERS

Each of three girls bought Savings Certificates during our recent "drive." Sonia bought more than Muriel, but not so many as Bridget. Each girl had a brother, who also bought certificates, David Trotwood buying twice as many as his sister, William Bailey four times as many as his sister, and Thomas Bowling five times as many as his sister. Between the six of them they

10

bought forty-four altogether. What were the respective surnames of the girls?

6. PARTIALLY MECHANIZED INFANTRY

THREE infantrymen, Anton, Ivan and Leon, wished to rejoin their unit at Bomsk. Leon had a motor-cycle, and as it would take but one passenger, a certain amount of foot-slogging was indicated. All three started together from Shutsk, Anton walking, and Leon taking Ivan as passenger on his motor-cycle. On reaching Gtov, Ivan dismounted and proceeded on foot, Leon returning to meet Anton and motor him to Bomsk, where all three arrived simultaneously, eight hours twenty minutes after the start.

Each walker averaged three miles per hour, and the motor-cycle on each of its three trips had an average speed of twenty-four miles per hour.

How far is it from Shutsk to Bomsk?

7. NIGHT FORMATION

A PARTY of men sleeping side by side in a tent arranged themselves so that each man's head pointed in the same direction as the next man's feet. In the result, three heads pointed north, and three pairs of feet pointed south. How many men must there have been in the tent?

8. A MINIATURE NUMBER PUZZLE

No digit occurs more than once.

2 is a square number.
3 is a multiple of 79.

The number formed by pre-fixing 2 to 3 is the square of 1.

9. THE COLLEGE OF ETCETERAS

FIVE candidates entered for the Cobleigh Medal. In each of five subjects 50 marks were divided among the candidates, the highest aggregate winning the medal. No one gained the same place in two subjects, and the marks obtained for any given place were different in every subject. The lowest mark allotted was 2. One candidate, and only one, had the same mark in three subjects, and there were no ties.

Brewer was 2nd in Telepathy, and 3rd with 9 marks in Esperanto.

Davy, who was top in Astrology and bottom in Esperanto, led Stewer by 3 in Telepathy.

Stewer was 1st in Palmistry and 5th in Telepathy.

Whiddon was 3rd in Palmistry, and had 20 marks for Astrology and 8 for Numismatics.

Gurney, with 24 marks for Telepathy, was 4th in Palmistry with 5 marks.

The highest mark in Esperanto was 2 more than that in Numismatics.

Who won the medal, and what was the aggregate score of each?

10. ESPIONAGE

A FIFTH Column organizer knows, by arrangement, that a certain agent, X35, was to have gone either to Chard or Christchurch. A letter from X35 says, "I had better not give my address in writing, but I can be found at the local H.Q. at the place which you will discover from the postmark." Now, nothing at all was visible on the postmark except the consecutive letters CH. Which rendezvous should the organizer select, and what are the odds in favour of his selection being right?

11. ANNO DOMINI

"HERE'S an age problem for you," said Doubleday.

"My father was born on August the fourth, and I on September the third——"

"What warlike dates!" I interjected.

"Yes, but the adjective doesn't apply to us personally. Dad served as a Special Constable all through the last war; he was a bit too old, and I, of course, was too young, for military service. He died on my birthday, and if you multiply his age by the age then attained by me, you get the year of his birth. At what age, and in what year, did he die?"

"It seems a bit sketchy," I said.

"All right, here's a further bit of information. Father was forty-two years old when I was born. Now go ahead and solve it."

12. TIME, PLEASE

AT what time is each hand of a clock pointing to a minute division on the clock-face, the minute hand being four minute divisions ahead of the hour hand?

13. CIPHER DIVISION

IN this division (where there is no remainder) it will be seen that the dividend consists of the digits which occur in the divisor and quotient, none of which is zero. Most of the letters are given, the other digits being replaced by dots. Can you discover the numerical values of the nine letters involved?

```
A B C D) A C R P Q S T B D (P Q R S T
         B Q Q Q S
         ─────────
         B C T T S
         B R D C C
         ─────────
         T S S D T
         T D . . A
         ─────────
         C A C B B
         C B . . T
         ─────────
           . . . D
           . . . D
           ───────
```

14. 3 NOUGHTS, 5 CROSSES
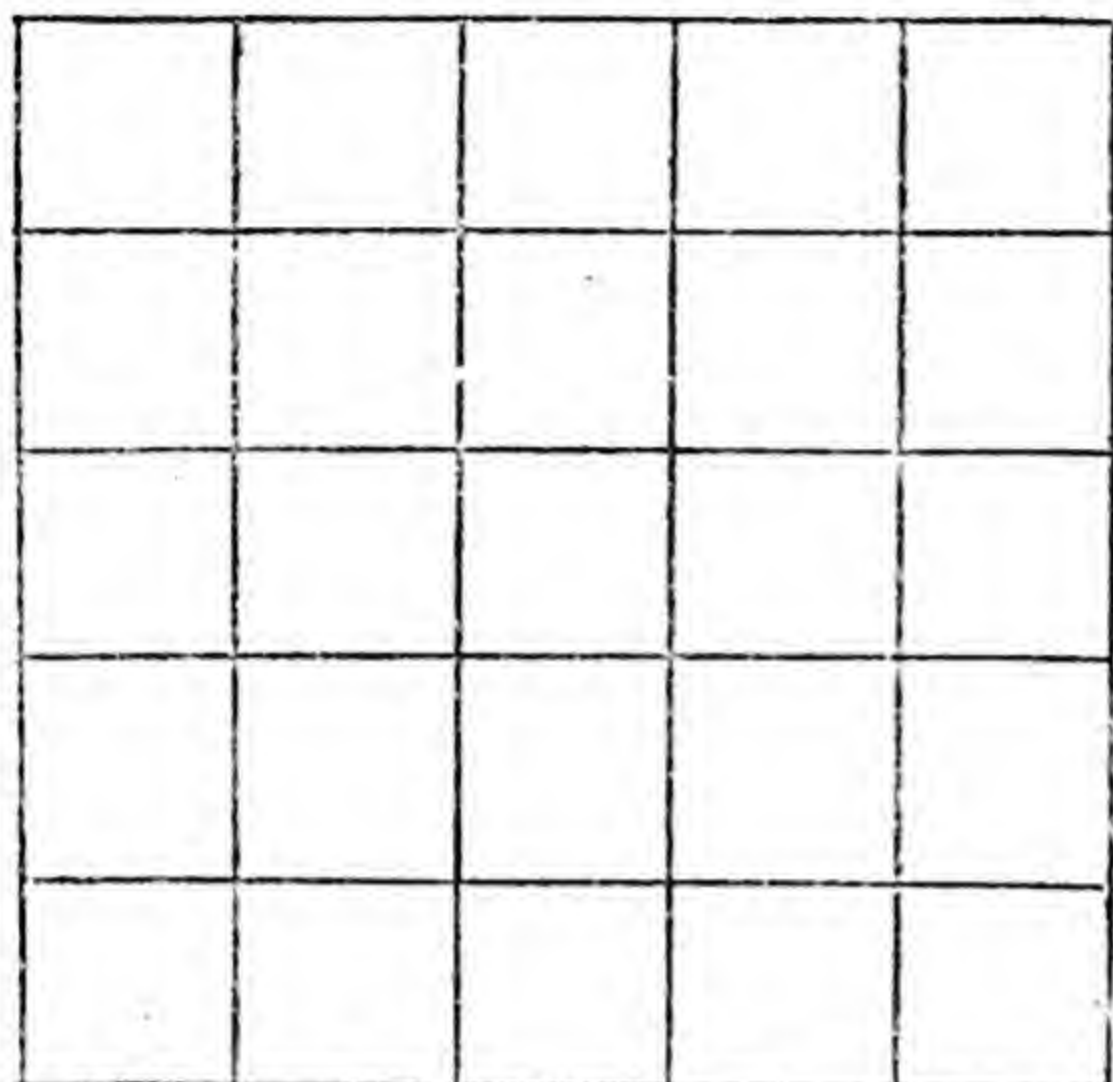
Insert three noughts and five crosses in eight of these blank squares, so that no cross is in the same row, column or diagonal as a nought.

(This means any diagonal, not merely the main diagonals.)

15. A BROWN MARKET

MR. ROWANBERRY, bringing home a large box of chocolates for the children, was greeted with enthusiasm.

"Ooh, what big ones!" said Edgar. "Are we to help ourselves, now?"

"Wait a minute," said Mr. Rowanberry; "every time one is taken, I shall want threepence from the taker, and will give each of the rest of you a penny."

"That sounds good business for us," said Wilfrid; "let's get going!"

So they did, and in the end each of them secured a different number of chocolates—no one fewer than three—and also made money on the deal. Joyce made two shillings more than Yvonne, and one shilling more than Cuthbert, but Peter did better still.

Mr. Rowanberry's scheme cost him ten shillings and ninepence. How many chocolates did Cuthbert take?

16. LIVE STOCK

IN a field there are cows, sheep and ducks. There are

more sheep than ducks ; the sheep and ducks between them have a hundred heads and feet, and are together three times as numerous as the cows.

How many cows ?

17. VOCATIONS AND AVOCATIONS

A LAWYER, a farmer, a curate and a schoolmaster, living in different places, are respectively engaged to the four ladies mentioned below. Each man plays one only of these games—cricket, golf, hockey, billiards.

One man lives at Ipswich. Margaret's fiancé is a lawyer. Denham lives south of the Thames. Nora's fiancé lives at Winchester. The Tonbridge man hates billiards. Laura's fiancé plays golf and lives north of the Thames. The curate, writing to Adams, expressed a desire to see Winchester. Kathleen is Colman's sister and has never met Bunbury. The farmer, who is Denham's cousin, plays hockey. The Oakham man bores Colman by talking of his own batting average. Colman does not know Margaret.

Who lives where, is what, is engaged to whom, and plays what ?

18. PROGRESSIVE PAYMENTS

"WHEN I came back to England three years ago," said Twidler, "I felt I must do something for poor old George's children; so I looked up his widow and arranged a little mathematical scheme for the kids' benefit. What do you think it was ?"

"Something to do with the cube root of the product of their ages, I expect," said I, knowing Twidler's habit of mind.

"No," said he; "simpler than that. I undertook to pay each midsummer a number of pounds equal to the square of each child's age—for a limited number of years, of course, as I am not a multi-millionaire ! All

the children are of different ages—no twins !—and last year each of them wrote me from school a nice little letter of thanks. This year my total payment will be forty-seven pounds more; can you find out what it will be, if I tell you that the figures of last year's total, in pounds, add up to thirteen ? "

19. IN THE COPPER RING

HAVING found an obliging bookmaker who was willing to accept a stake of any whole number of pence, Betts, Wager and Punt each had a starting-price bet of a three-figure number of pence on the favourite, which won at x to 1, where x is integral. Each man's winnings, expressed in £ s. d., presented the same three numbers as the numbers of hundreds, tens and units respectively in the pence he staked. Also, the number of pounds won by Punt, the shillings item in Wager's winnings, and the pence in Betts's formed an ascending arithmetical progression.

What was the starting-price, and how much did Punt win?

20. PUDDING PUZZLE

TWO of three children will eat rice pudding, two sago, two tapioca. One, who won't eat tapioca, won't eat sago, and Mary, who won't eat sago, won't eat rice. Which of these kinds of pudding will John, William, and Mary eat ?

21. HAIR APPARENT

THAT irresponsible young man, Don Pedro de Capillote, heir to the Principality of Mañana, always dreaded the day when he should assume the sovereignty of that somewhat uneasy state. On attaining the age of thirty he consulted a soothsayer, and received the following information :—

"Of the hairs of your head you will lose one during

the next twelve months, the next year four, nine the next, and so forth; to wit, a square number each year, the squares increasing progressively in their natural order. When the number of hairs remaining shall be equal to the years of your age, you will succeed to the throne."

Don Pedro immediately employed a firm of contadores, Sñres. Muy, Muy, Mucho y Muy, to ascertain the number of hairs on his head; and while they were further endeavouring (with no great success) to discover the fateful year from the said number, which was 17,568, he had the happy idea of applying to his scalp a widely-advertised preparation for promoting the growth of new hair, hoping by this means to defer the date of his accession. He succeeded, in fact, in growing two fresh hairs each year. Assuming the accuracy of the prediction, how old would Don Pedro be on coming to the throne ?

22. ROUTES

THE lines in the diagram indicate roads running either E. and W. or N. and S. Adams, Burton, and Collins live at the road intersections marked respectively A, B, and C.
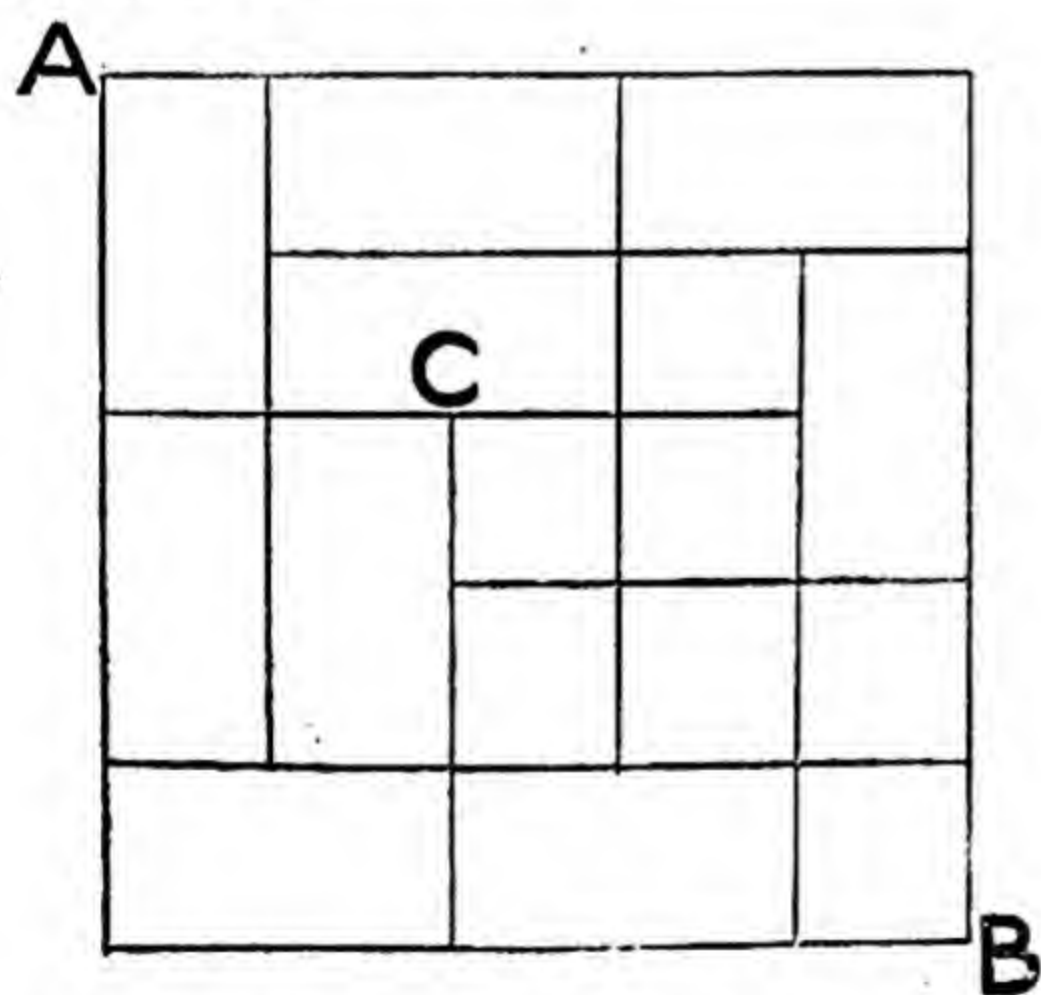
(a) By how many different routes can Adams go from his N.W. corner to Burton's house in the S.E. corner, always travelling either E. or S., so that all his journeys will be of the same length ?

(b) With the same restriction, how many routes are open to Collins when visiting Burton ?

(c) If Adams wishes to visit Burton unknown to Collins, by how many routes can he perform the journey without passing the corner at which Collins's house stands—still, of course, without any reversal of direction?

23. THREE DIGITS

IF a number of three different digits is taken from the number consisting of the same three digits in the reverse order, the result consists of the same three digits in yet another order.

What are the numbers?

24. MUCH MISSINGHAM

FIVE teams, representing rifle clubs of the Much Missingham district, recently held an Inter-Club War Weapons Sweepstake Competition. Each individual paid an entrance fee of one pound, and after five pounds had been put aside for the Good Cause, the winning team was to take the remainder. This was to be shared out in sums, all different and all whole numbers of pounds, in order from the top scorer down. No two teams had the same number-scheme for sharing the spoil; this, by the way, was only just possible for the numbers concerned.

Shuter was top scorer of the winning team; Goodenough, the runner-up, got half as much again as Fayre, who was third. How much did Shuter get?

25. HOSPITALITY

"YOU may be quite sure," said Mrs. Turkey, "that my party for dinner on Christmas Day was as small as possible. Still, all these people were present :

"My sister Mrs. Mistletoe, her brother-in-law and his wife Holly, my daughter Julia, my cousin Wenceslas and his wife and daughter; and from Mon Répos across

the road, a war widow, Mrs. Snapdragon, and her aunt Maria, who was staying with her.

"Now, not forgetting my husband and myself, how many of us do you think were there ?"

26. FELINE INTELLIGENCE

FOR each of the nine digits from 1 to 9 a certain letter has been substituted. This provides us with the fact that the square of CAT is MOUSER. Part of the work establishing this result is given here; you are invited to discover the complete numerical operation.

```
              C A T
              C A T
          ─────────────
          S .   .   .
        T O M   .
        .   .   S O
          ─────────────
        M O U S E R
        ═════════════
```

27. ROUND THE TABLE

TEN persons, all of different ages, ranging from 21 to 30, were seated at a round table at equal intervals in such a way that the ages of any pair sitting side by side had the same sum as those of the persons facing them. Thus in the diagram 22 + 25 = 23 + 24, 25 + 26 = 23 + 28. But the actual arrangement was quite otherwise.
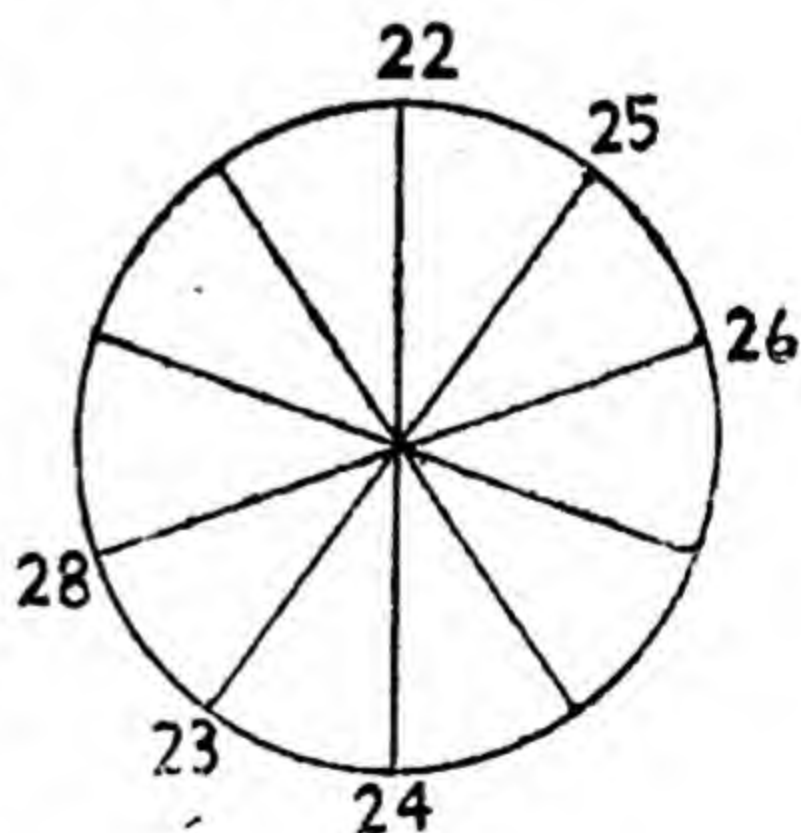
What was it ?

28. WIRE

OUR firm has supplied the Bolonian government with four lots of wire, each at a certain whole number of pence per yard, the four prices being different. The lengths supplied are, respectively: twelve miles eleven hundred and sixty-seven yards; sixteen miles twelve hundred and thirty-three yards; fourteen miles seven hundred and seventy-five yards; and twelve miles sixteen hundred and four yards. The total cost is three thousand two hundred and thirty-two pounds ten shillings and fourpence.

But the detailed record of the prices has unfortunately been destroyed by enemy action, and no one can remember the figures. What are they?

29. DRINKS ALL ROUND

A PARTY of twenty men distributed themselves among four rooms at an inn—two front and two back. Each man in each room stood one round of drinks in the course of the evening, and each individual drink cost fourpence. Now, the sum spent in drinks by the front-roomers was two shillings more than that spent by the occupants of the back rooms. How many men were there in each room?

30. SIMPKIN'S SUCCESS

AT the annual meeting of the Amalgamated Bottle-menders' Union, Simpkin was elected to the office of Secretary. The other candidates were Miskin, who got only ten votes, and Hankin, Wilkin and Perkin, who tied at a figure consisting of the same two digits as the number of votes recorded for Simpkin. Simpkin's majority over Hankin was 4 per cent. of the number of persons present, only one-third of whom took part in the voting. How many attended the meeting?

31. A RACE OF LIARS

THE brothers Wrott, named respectively, Tommy, Wat and Bally, together with their cousins, George and Adolf Washington, had a cross-country race, the result of which was reported by themselves as follows :

Adolf: Wat won and I was second.

Bally: Wat was second; I was fourth.

George: I was third and Tommy was last.

Wat: George won; I came in last.

Tommy: I was second; Wat was third.

Each boy made one true statement, but none made two. What was the result of the race?

32. THE BRONX BROS.

CATCHO is the oldest and Bingo the youngest, and ten times the difference of their ages is the sum of those of Catcho and Limbo. Porko's age, which is the average of those of the others, differs from Bingo's by twice as much as Catcho's does from Limbo's. The gap between Limbo and Bingo is greater by two years than that between Catcho and Porko. What are their respective ages?

33. LINES AND PAGES

THE title-page of a book has 12 lines of print, the preface averages 31 lines per page, and the rest of the book 27 lines per page. If the total number of printed pages in the book is 252, and the total number of lines of print is 6,805, how many pages are there in the preface?

34. DIAGONALS

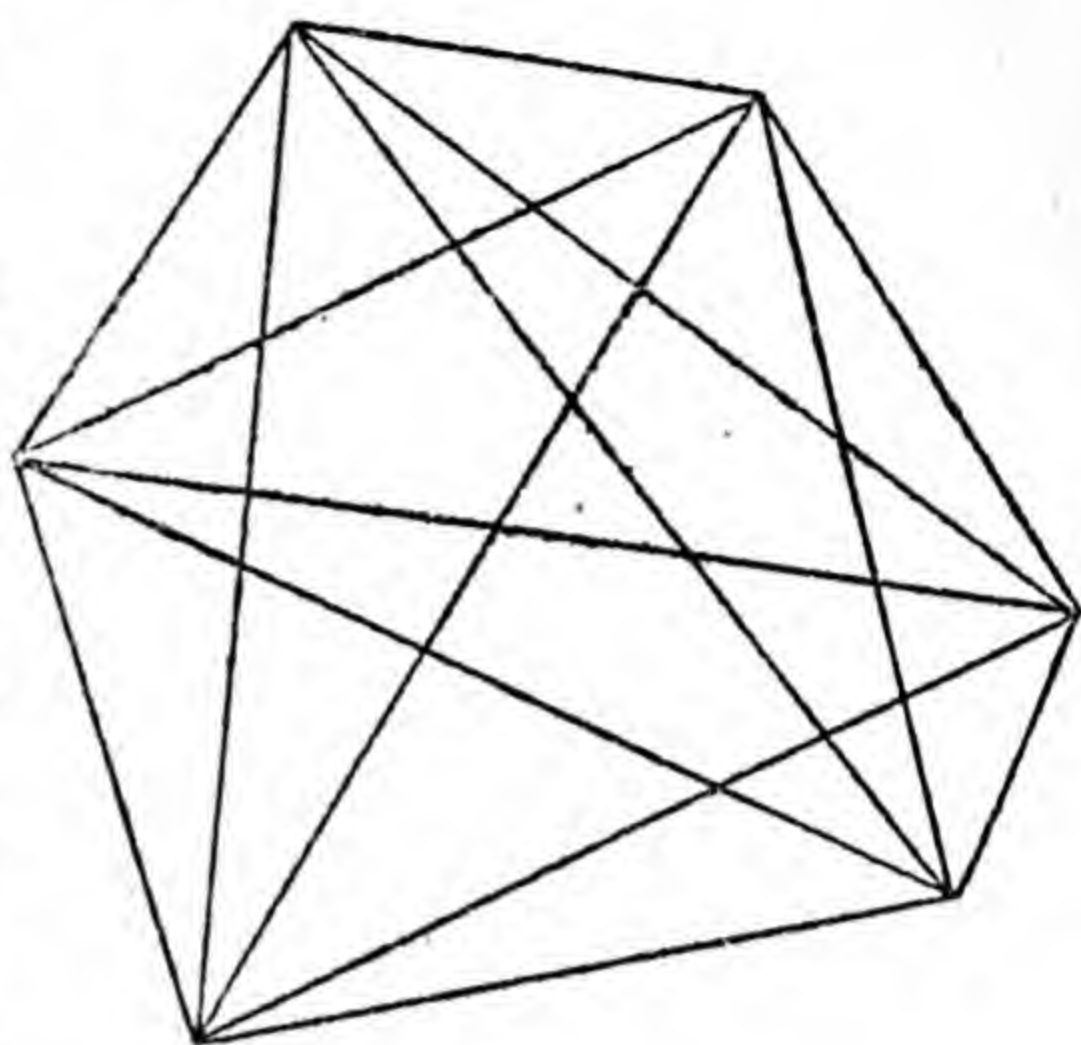HERE is an irregular hexagon with all its nine diagonals.
You are asked to discover—

(a) At how many points the diagonals cross one another;

(b) Into how many bits these diagonals are thus divided;

(c) Into how many separate compartments they divide the figure; and

(d) How many triangles there are altogether in the figure.

35.   WAR SAVINGS

THREE families in our road, each consisting of father, mother, and son, started the year with a War Savings Moneybox scheme. The fathers collected half-crowns, the mothers shillings, and the boys pennies, in their respective boxes.

Each family has now collected 100 coins, amounting in each case to £5, and Tommy's mother has more coins in her box than anyone else. Mr. Jones has collected £2 10s. 6d. more than Albert, and Mrs. Smith's box contains two coins more than Mr. Brown's.

What is Willie's surname, and how much has he collected ?

36.   ABSENTEEISM

OUT of a party of thirty-five boys sent out to dig potatoes, there were some who quietly faded away and amused themselves elsewhere. Each of the others, however, brought in the same number of potatoes, the total collection amounting to 3,277. How many boys absented themselves ?

37. FIND THE NUMBER

A CERTAIN number is eighty-one times the sum of its digits, and the number formed by the first two digits is greater by one than the sum of the other two.

38. COUNTING THEIR CHICKENS

THERE are now only six poultry keepers in our village, the total number of fowls kept being one hundred and eighty-five.

Brodie's stock exceeds Atchem's by half the number kept by Dawkins, and Cluck has as many as Eggar and Foulis put together.

Dawkins has one-quarter as many as the difference between the flocks of Cluck and Atchem, and Foulis has one-third as many again as Eggar.

What head of poultry does each of the six keep?

39. ADDITION

THE letters of a keyword, which you are asked to discover, are numbered 1, 2 . . . 9, 0. Each line of the addition forms an English word when the corresponding letters are substituted for the digits.

$$
\begin{array}{r}
8\,7\,4 \\
3\,9\,2\,0 \\
6\,4\,7\,1\,6 \\
1\,2\,6\,9\,2\,3 \\
8\,5\,9\,4\,8\,9 \\
3\,9\,7\,3\,5\,2\,1\,8 \\
3\,4\,1\,0\,9\,8\,3\,9\,6 \\
8\,5\,2\,6\,7\,8\,3\,5\,4 \\
\hline
1\,2\,3\,4\,5\,6\,7\,8\,9\,0 \\
\hline
\end{array}
$$

40. SPEEDS

Two trains, A and B, start simultaneously from opposite termini of a 450-mile stretch of railway, each travelling non-stop, at a speed which may be taken as uniform, to the other end.

A completes the journey 4 hours after passing B, and B completes its journey 9 hours after passing A. What were their respective speeds ?

41. STOCKING THE LIBRARY

THE sum of £10 9s. has been spent on three sets of volumes, the most numerous on History, a smaller number dealing with Philosophy, and the smallest set with Zoology, the price of each volume being as many shillings as there are volumes on that subject. The total number of volumes is 23. How many volumes are devoted to each subject ?

42. A PAIR OF ACES

THOSE celebrated fighter pilots, Ivor Gunn and Di van Zoom, were comparing notes at the end of a busy day. Each had made the same number of flights against enemy planes, the Englishman averaging two and a quarter flights to a victim, and his Dutch colleague two and a half.

"I'll catch you up," said the latter, "before either of us has made fifty flights, as sure as my name is Dionysius ! "—which, regrettably, it was.

Next day, each made one flight and added to his score, with the result that van Zoom fulfilled his undertaking, each having now accounted for the same number of hostile aircraft. This would be at least how many ?

43. PRE-WAR POTTERING

POTTER'S car being out of order, I ran him over to Muddleton and back in mine. I paid no special attention to my speed, but when we got home Potter, who has an arithmetical mind, told me that on the outward journey I travelled seven miles an hour faster than he is in the habit of doing.

"Coming back, then, I must have been driving at twice your usual pace," I said, conscious of having let her out a bit on the homeward run.

"Not quite," said Potter; "four miles an hour short of that. But your average speed for the double journey works out at 43·2 m.p.h.—much too fast for safety!"

Well, that's as it may be; but I should be sorry if I had to limit myself to Potter's rate of progress, which, according to his statements, is—what?

44. SHARING THE SWEETS

MR. Smith has four children, aged 12, 9, 5, and 4.

He gave the eldest 49 chocolate creams, telling him to keep 24, and to divide the rest among the other three proportionately to their ages, with this modification, that, while a sister's age was to have its face value, a brother's age was to count double its face value. Thus, if the first (in the given order) were a sister, and the other two were brothers, their shares would be in the ratio of 9 : 10 : 8.

The sharing was duly carried out on these lines, without dividing any single sweet. What was the relationship between the youngest child and the one who was distributing the sweets?

45. THE WAR HITS BOLONIA

OUR correspondent at Vlajlo reports an egg shortage. He describes an egg queue of fifty persons, seen recently

in the streets of that city, as follows:

"The first and every subsequent fifth person carried an umbrella; the second and every subsequent third person carried a shopping bag; the third and every subsequent fourth person had a gas-mask. The female element preponderated, only the fourth and every subsequent fifth person being of the male sex."

What we want to know is (a) how many men had gas-masks? (b) how many men carried more than one of the three items of equipment? (c) how many persons were fully equipped with all three?

46. MENTAL ARITHMETIC

CHARLES has as many pence as John has farthings. If Charles gave John $4\frac{1}{2}$d., John would have as many pence as Charles had farthings. How much money have they between them?

47. BY ROAD AND RAIL

I RECENTLY made a journey from Angleton to Fulhaven in several stages. The first stage, by train to Brooding, was a mile more than one-quarter of the whole journey; from Brooding to Coachly, which was a mile more than one-quarter of the distance from Brooding to Fulhaven, I went by car. A car also took me thence (a mile more than one-quarter of the remainder of my journey) to Dorminster. From Dorminster I went by train a mile more than a quarter of the distance from Dorminster to Fulhaven, and found myself at Emery. The remaining bit, from Emery to Fulhaven, I did partly by car and partly by train, the distance gone by rail being five-sixths of that by road. Altogether I found that I had gone as far by road as by rail.

How far is it by rail from Dorminster to Emery?

48. SOAP

"My wife and I once spent seventeen days in the wilds of Bolonia," said Smith. "We took young Harold Brown with us, and forgot to warn him that soap is unprocurable in those regions. So we found ourselves at the back of beyond with only two cakes of soap among the three of us.

"Fortunately, we had provided ourselves with two really large-size cakes, and arranged to let Harold have one for a certain number of days, Betty and I sharing the other. Then we swapped over with Harold, who had, of course, used less than we had. In that way we carried on till the end of our stay."

"I hope it saw you through," said I.

"Oh, yes," said Smith. "We had a quarter of a cake left, and Harold had a third of a cake. And we estimated that each person had used the same amount of soap per day. The question I want you to answer is this: When did we exchange cakes with Harold?"

49. THE OLDER THE FEWER

At Miss Terry's New Year's Party "for children only," two-thirds of the guests were under 12 years old. Every child under 12 pulled four crackers, and each of the others, three. Miss Terry, owing to nervousness, never pulls a cracker.

In all, forty-four crackers were pulled.

How many children did Miss Terry entertain?

50. PASTURE

If 40 cows are turned into a certain field, they will find just enough pasture for 20 days; if 30, for 30 days.

How long will it last 25 cows, assuming that the grass grows at a uniform rate?

51. PERSONAL POINTS

IT was near the end of the rationing period, and coupons were exhausted. George had 5 ounces of boiled sweets, Ann 3 ounces, Henry none. They agreed to divide their store equally on a business basis, Henry contributing the sum of 4d.

How should this money be divided between George and Ann?

52. FIND THE FIGURES

THE letters in this diagram stand for figures. If the letters representing 1 to 10 were placed in consecutive order they would form a word.

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R         T
  D B
  E G
A I N M
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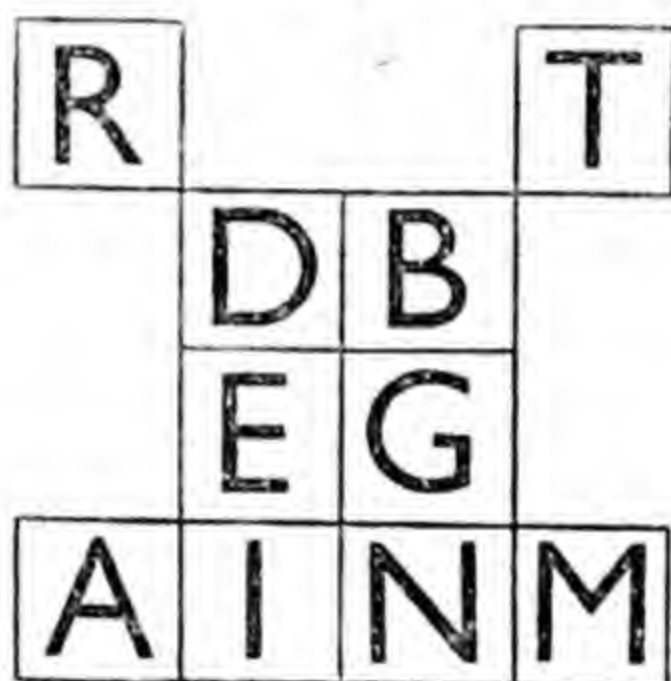
Can you tell what the figures are from the following data?—

The 4 numbers of each diagonal add up to 21.
The 4 numbers of the central square add up to 21.
The 4 numbers of the base add up to 21.
The 4 numbers in the corners add up to 21.

53. LONG, LONG AGO

IN the year 69 B.C., Marius was two-thirds as old as Flavius. Twenty-eight years later, the age of Marius was four-fifths that of Flavius.

In what year was Marius born?

54. DIVIDED INTEREST

IN the division sum below, the whole of the divisor is given to you, but all other figures are indicated by dots. You are asked to complete the sum, subject to the following condition: none of the digits in the divisor must appear in the dividend, the quotient, or the working of the sum.

Zero may be used, of course.

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1 2 6 ) . . . . ( . .
          . . .
          ———
          . . .
          . . .
          ═══
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55. NUMERICAL CIPHER

"THE number PQQR," said Potter, "is the square of QR, where, of course, P,Q,R stand for undisclosed numerical symbols. Can you find what these are?"

"Is there more than one solution?" I asked.

"Well, yes," said Potter; "there are two possible solutions, and yet each is, in a sense, unique."

This sounded rather like nonsense to me, but I set to work and discovered one solution, and proved (to my own satisfaction) that it was the only one possible. However, Potter was able to prove his contention. Can the reader discover the two solutions?

56. THE DISPATCH RIDER

A COLUMN on the march is seventeen miles long. A dispatch rider leaves the rear, delivers a message at the head of the column, and then returns to the rear. When the rider leaves the rear, the head of the column is abreast of a milestone X. When he regains the rear he finds himself at the milestone X. During the whole

time the column is moving at a uniform speed. Neglecting the time taken to deliver the message, how far did the dispatch rider travel?

57. UNLIKE PAIRING

UNCLE PETER is in the early thirties, but younger still in spirit, so that he and his nephew, Ethelbert, get on very well together. The other day he fished up a collection of silver coins—half-crowns, shillings and sixpences— from his trouser pocket, and spread them out upon the table.

"Golly, what a lot of money!" said Ethelbert.

"Now look here," said his uncle. "If I pair off each half-crown with either a shilling or a sixpence, there are sixty-three coins left partnerless; if I make as many pairs as possible consisting of a shilling and a half-crown, or a shilling and a sixpence, there are thirty-nine coins left; and if I do the same sort of thing with the sixpences there are five coins left. How much money is there on the table? No counting, of course!"

"Well," said the precocious child, "I can't exactly say. Is the number of shillings more than your age?"

"No, less," said Uncle.

Whereupon Ethelbert gave the correct sum, and was rewarded with one of the sixpences.

What was the sum?

58. CROSS-NUMBER PUZZLE

Across :

1. Prime number. 3. Sum of digits is ten. 6. Palindromic multiple of 13 *across*. 7. Prime factor of 9 *down*. 8. Multiple of 7 *across*. 10. Factor of 2 *down*. 11. Cube of 7 *across*. 13. Prime number. 14. Multiple of 1 *across*.

```
 1    2    3    4    5

 6              7

 8         9   10

11             12

13        14
```

Down :

1. Cube of 12 *down*. 2. Cube of cube. 3. Multiple of 1 *across*. 4. Multiple of sum of digits of 1 *down*. 5. Product of 3 *across* and 7 *across*. 9. Multiple of 7 *across*. 12. One more than a multiple of 1 *across*.

59. EGGS

THE number of eggs in a basket doubles every minute. The basket is full of eggs by 12 o'clock. When was the basket half full ?

60. MR. FACTOR'S FAMILY

"I HAVE three daughters and one son," said Mr. Factor, "and the sum of my daughters' ages is the square of my son's age."

"Is he the youngest ? " I asked.

"No, he's a year older than one of his sisters," said Mr. Factor, "and the product of my daughters' ages is two thousand seven hundred and seventy-two. Can you tell me the ages of my family ? "

61. CARD SENSE

ALLOT such numerical values to the letters as will make the following valid when treated as an addition.

```
P L A C E
  A C E
─────────
T O W I N
─────────
```

Readers should find this easy, in spite of the fact that there is no key-phrase to aid their researches.

62. AT OUR BAZAAR

THE three winning numbers in the raffle were chalked up in a row; each was a two-figure number, the middle one being greater by one than the sum of the first and last. It was Potter who remarked that the number formed by the six figures as they stood was an exact square. "And," he added, "the middle digit in its square root is less by two than the sum of those on either side of it."

What were the three winning numbers?

63. UNPLEASANTRY

"DID you see that competition in *The Weekly Horror?*" said James. "They gave the names of four people to be placed in order of unpleasantness—unpleasantest first—winning order to be decided by the votes of competitors.

"Molly," he continued, "got two right; her list was Quisling, Himmler, Laval, Mussolini. George sent in Mussolini, Quisling, Himmler, Laval—only one right."

"And how did you get on?" I asked.

"Oh, I didn't win! I put Himmler and Musso next each other, which didn't agree with the winning list."

What was the winning order?

64. SUITS

FOUR cards of different suits are dealt, one apiece to A, B, C, D. B says, "Mine is not a club" ; A says, "Mine is not a spade"; D says, "Mine is not a diamond"; A says, "Mine is not a heart"; C says, "Mine is not a spade." Only one of these statements is true. Who held what ?

65. THE SNAIL TRAIL

Two gasteropods had in view a journey to a common objective. For the moment—for a great many moments, in fact—they rested, side by side.

Albert was the first to march; on March 1st he advanced a foot, going three feet next day, five the next, and so on.

Timothy got going on March 4th, travelling twelve feet that day, thirteen the next, and so on.

On what day did Albert overtake Timothy, and how far did each of them progress on that date ?

66. COMBS

As usual, Miss Snooper had managed to get access to things she was not meant to see. "So this is where all the combs have got to ! " she exclaimed. "Some of 'em," said the man in charge. "They look a cheap lot," she said. "Well, there are four qualities here," said he; "1,386 quality A, 1,092 quality B, 1,001 quality C, and 1,716 of the best quality D—all under 1s., cost price, but there's no saying what the public will have to pay when they're released for sale. They cost the firm £165 11s. 10d., and I expect the profit will be a good bit more than that."

What was the cost price of each quality of comb (each being a whole number of pence) ?

67. RIDE AND TIE

DAN and Bert took a pony from Exton to Wybury, an even number of miles, on the "ride and tie" principle. First Bert rode for a mile, leaving the pony for Dan to ride when he had walked to that point. Dan rode the next mile, leaving the pony for Bert, whose pace afoot was half that of the pony; and so on. They finished the ninth mile of their journey together. From there on they continued similarly, Bert again taking the first ride, but the walking pace of each of the two was slower than before by half a mile per hour, while the pony's pace was now twice Dan's.

They finished their journey together, the total time taken being three hours.

How far is it from Exton to Wybury?

68. CARDBOARD ECONOMY

ON each day of the week I form its name by fitting lettered cards into a grooved frame, thus:

$$\boxed{S}\boxed{U}\boxed{N}\boxed{D}\boxed{A}\boxed{Y}$$

What is the smallest number of cards I can do this with,
  (a) if each card is lettered on one side only,
  (b) if the other side may also bear a letter?

69. FIVE TRADERS

EACH of five traders, whose names were Beer, Cork, Pepper, Wood and Wool, sent a consignment of goods to one of the others, none sending to and receiving from the same person.

The commodities were beer, cork, pepper, wood, and wool, but no commodity had the same name as its sender or receiver.

Beer's consignment went to Wood. Wood sent pepper to the sender of cork. Cork received beer, and the sender of wood had the name of the commodity received by Pepper.

Who sent what to whom?

70. ALPHABETICAL

IF $A^3 \times B \times C^2 \times D^2 =$ AABAC, find the digits A, B, C, D, given that they are prime.

71. WHEN THE FROST COMES

$100°$ Centigrade represents the same temperature as $212°$ Fahrenheit, and $0°$ Centigrade corresponds to $32°$ Fahrenheit. At what temperature will the readings on the two scales be the same?

72. A CRAZY RACE

"LET'S have a race," said Turtle to Swift. "I know you're a champion sprinter, but we'll arrange a handicap. From your gate to mine is 147 yards. Now we'll start simultaneously, each level with his own gate, and run to the other's starting point. We pass at some point P; you score a point for every yard I run before reaching P, and two points for every second I take to run the course; I score a point for every yard you run before reaching P, and one point for every second you take to run the course."

Swift agreed, and took $5\frac{3}{5}$ secs. to finish after passing P, whereas Turtle took $12\frac{3}{5}$ secs. after passing P. Speeds being supposed uniform throughout, who won, and by how many points?

73. DREKE MANOR

THE wide, level grassland of Dreke Manor is bounded on the north by a high wall running east and west. This wall is not continuous, for in one place a gap has been purposely left, so that those within may feast their eyes upon the landscape without, which is of great beauty. Fifty yards east of the eastern extremity of the gap, a narrow path runs due south from the wall. The point on this path that gives the widest view of the outer world is 80 yards from the wall. How wide is the gap?

74. THREE-SPEED GEAR

PEDDER always walks at the same pace; he trots twice as fast, and runs three times as fast as he walks. Going to the station, 3 miles away, on Monday, he walked a mile, trotted a mile and ran a mile. On Tuesday he tried trotting all the way, and found that he took six minutes less than on Monday.

How long did he take on Monday?

75. NINE DIGITS

IF we write the nine digits, 1 to 9, in a certain order, and divide the number so formed by a single digit, a quotient is obtained whose digits are the eight which remain after the divisor has been removed. Can you substitute the digits for which the letters stand in the following, which is a representation of one of the two possible solutions?

$$X) \underline{P\ Q\ R\ S\ T\ U\ V\ W\ X}$$
$$\overline{V\ S\ R\ W\ U\ T\ Q\ P}$$

76. NINETY-NINE

A FAMILY consists of father, mother and three children—two boys and a girl. The sum of all five ages is ninety-nine; the difference of the parents' ages is less by one than the difference of the boys' ages, and less by two than the difference of the ages of Dora and Peter. The father's age is the product of the ages of William and Peter, and the mother's is the product of those of Peter and Dora.

What are the ages of these five persons?

77. ROAD FRONTAGE

BING, Ling and Wing are the respective owners of three square fields, lying side by side, and presenting a straight continuous frontage of 1,330 feet to the road which runs past them. Bing's plot is as big as the other two together, but his frontage is only 9 feet longer than Wing's. What is the length of Wing's?

78. A MIXED FOURSOME

PETER tells me that he and his two brothers are all at the same preparatory school, that he is leaving next term, having won an entrance scholarship to Wellingbury during the last few days, that all three boys and Betty, their younger sister, had birthdays the month before last, that no two of their four ages are the same or consecutive numbers, and that John was twice as old as Betty a year ago.

I think he must have got that scholarship on his mathematics, for he finished up with the following burst of statistical information :

"If you multiply my age by John's age and add the product of Betty's and Michael's ages, you get twenty-one more than you would if you multiplied mine by Michael's

and John's by Betty's and added the results together."
How old is Michael?

79. AQUATICS

THE bath was nearly full of water and Bobby was floating on it a toy boat containing an iron weight. Bobby removed the weight from the boat and placed it in the water. (*a*) Did the water in the bath rise, fall, or remain at the same level? (*b*) Why?

80. CROSS-NUMBER PUZZLE

1	2	3		4
5			6	
7	8	9		
10	11		12	13
14			15	

Clues—*Across.*

2. Add a prime number to its square—
    The year of my wife's birth is there.

5. Multiply 10 by a factor of 3;
    This reversed will the product be.

6. Its digits are found in 2 *across.*

7. One less than 12 *across.*

9. Square of 15 *across.*

11. The Blackbirds, it would seem,
     Have joined a rugger team.

12. Sum of 3's digits.
14. Factor of 7 × factor of 2 *across*.
15. Tot up column 1,
    And this section's done.

Down.

1. Factor of 2 *across*.
2. Factor of 10 *down*.
3. Digits 5, consecutive,
   Out of order this will give.
4. A cube.
6. Three-quarters of a normal year
   (Fractions, of course, must disappear).
8. Add to each digit of 4
   A number, and you'll score.
10. Factor of 6 *down*.
13. Factor of 4 *down*.

81. TANKS

A CHAIN of 6 strong points runs from N. to S. Each (excepting, of course, the most northerly) contains one-third as many tanks as there are to the north of it. The fourth has 72 more than the third. How many tanks does the most southerly point contain?

82. SPOT THE POET

"HERE are four poetical quotations," said Mr. English, "A, B, C, and D, and I am asking you four boys to name their respective authors."

Jones gave: A, Milton; B, Goldsmith; C, Keats; D, Cowper.

Brown: A, Wordsworth; B, Pope; C, Shakespeare; D, Cowper.

Smith: A, Milton; B, Cowper; C, Shakespeare; D, Gray.

Harvey: A, Wordsworth; B, Pope; C, Shakespeare; D, Gray.

"Well," said Mr. English, "every quotation has been rightly placed by at least one of you. Jones, Smith and Harvey have named the same number correctly, and Brown has been somewhat less successful."

What was the correct list?

83. A DIP INTO THE FUTURE

THE Clairvoyant was fore-reading Southengland, a chatty historical work of the 22nd Century:

The year 2000 saw the completion of four roads (the Chanways), straight and of imperceptible gradient, running from Reading, the seat of government, to the South Coast. Another road (the Wilts-Kent), of similar character, crossed these at four points, the distances between successive crossings being as follows: From the W. Chanway (or "Wey Highway") to the Portsway (or "Via Pompeia"), 17 miles; thence to the Midway (or "Yidway"), which led to Brighton, 9 miles; and from this to the E. Chanway (or "Tunway"), 29$\frac{1}{4}$ miles.

The corresponding distances from each Chanway to the next, along the Sunway, a similar road connecting the South-Western and Essex sun-power stations, were respectively 15 miles, 4 miles, and . . .

At this point the "power" gave out. So I am inviting readers to supply the missing distance. The roads are to be regarded as straight lines on a map, earth-curvature being ignored.

84. FIREWORKS

AT the end of the war, Mr. Touchpaper gave his sons £1 17s. 1d. to spend on fireworks. Each boy spent the same amount and bought twenty fireworks, that is,

one or more of each of the following: shilling rockets, ninepenny Roman candles, twopenny squibs, and penny crackers.

All their selections were different, and no one boy bought the same number of any two kinds of fireworks; double figures for any particular firework occurred in two boys' lists only (crackers in both cases).

The number of Roman candles bought by Alfred and Dudley together equalled the number of crackers bought by Charles, and Edward bought only one rocket. How many squibs did Bertram buy?

85. POTTER'S VIVA

EVEN the less mathematically-minded do not escape Potter's attentions. He confronts them with a series of questions to be answered *viva voce*—no paper work allowed—time limit, a minute for each question. Here is a sample:

1. How many odd numbers are there between 0 and 40?
2. How many between 32 and 90?
3. How many multiples of 3 between 50 and 100?
4. How many square numbers between 2 and 150?
5. If Christmas Day is on a Sunday, what day of the week is the following February 1st?
6. If Christmas Day is on a Thursday, how many Saturdays are there in the following January?
7. How many leap-years are there from 1900 to 1944 (both inclusive)?
8. Of the years 1940-50, how many have prime numbers?

86. STAMP COLLECTORS

ALARIC, Basil and Cuthbert were starting to collect stamps. Each had acquired a small nucleus from various

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sources, and even at this early stage they appeared to have grasped the principle that quality, which is to say rarity, was to be preferred to quantity.

"If you'll swap that 10-kjinta Bolonian for my twelve Bessarabians," said Cuthbert to Basil, "I shall have only half as many stamps as you."

"No thanks," said Basil; "but if I give Alaric my ten Nicaraguans for his surcharged Rondarian, he will have half as many again as I shall."

"Nothing doing!" said Alaric. "I'm willing, though, to give Cuthbert nine French Colonials for his purple Dellacruscan, which will make his stamps three times as many as mine."

Cuthbert, however, did not rise. How many stamps had each of these budding philatelists?

87. MAGIC SQUARE

HERE is an uncompleted "magic square," formed from the numbers 1 to 25.

	6	5		
			16	10
11	20			
9			15	18
	13	19	7	

Twelve of the twenty-five numbers are in position. You are asked to insert the other thirteen numbers, listed below, so that each row, each column, and each of the two main diagonals shall add up to 65.

1, 2, 3, 4, 8, 12, 14, 17, 21, 22, 23, 24, 25.

88. ICED CAKES AND ICES

"ONE Bank Holiday," said Jorkins, "the missus and the kids and I had tea at Ye Kosy Kafe. Each person's tea cost the same, and the bill came to eleven and nine-pence. Cakes were 2d. plain and 3d. sugared, tea $3\frac{1}{2}$d. a head, and ices 9d. a time. Each of us had a different number of cakes—no one had as many as 10.

How much did the ices come to, and how many 3d. cakes did we have?"

89. A MATHEMATICAL JOURNALIST
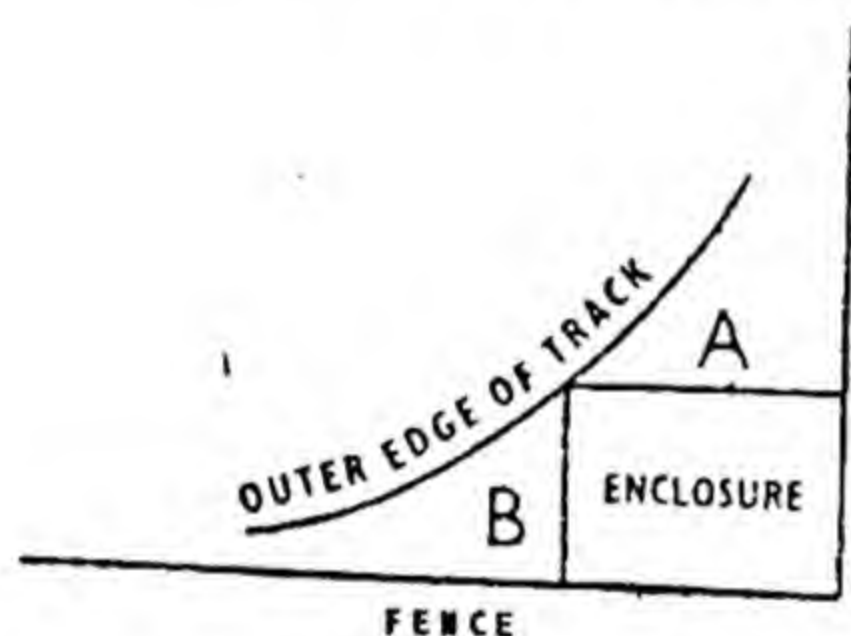
THE square sports ground at Upper Middleton is enclosed by a low fence, which touches the outer edge of the circular running track at four points. The public have to stay outside this fence, but in one corner of the square (see diagram) there is an oblong enclosure to which officials and the Press are admitted.

A reporter, talking to the secretary in the enclosure, asked him the length of a side of the fence. "I forget the exact figure," said the secretary, "but I know it is an even number of yards. However, if I measure the sides of the enclosure, I can calculate it for you."

He measured the shorter side (b) and found it to be 25 yards long.

"Well," said the reporter, "I can see that the length (a) is less than twice that; so you needn't trouble to measure it." And, making a short calculation, he correctly determined the length of one side of the fence.

What is this length?

90. FUEL

EVERY month for the last half-year Johnson's fuel bill has been the same. "To Fuel"—£x ys. The cheque he drew to cover the six months was for £y xs.

What do x and y represent?

91. HUNTING THE U-BOAT

DURING the last four years or so, there has been keen rivalry between H.M.Ss. *Buttercup, Cowslip,* and *Dandelion* over the bagging of U-boats.

Two of them have now reached double figures. B has sunk half as many again as C would have sunk if C had sunk half as many as D. D has sunk half as many again as B would have sunk if B had sunk half as many as C.

How many have been sunk by each?

92. HOLIDAY WEATHER

WHEN I was last away on holiday, the weather might have been worse; it rained on 9 days, but whenever it rained in the morning the afternoon was fine, and every rainy afternoon was preceded by a fine morning. There were 7 fine mornings and 8 fine afternoons.
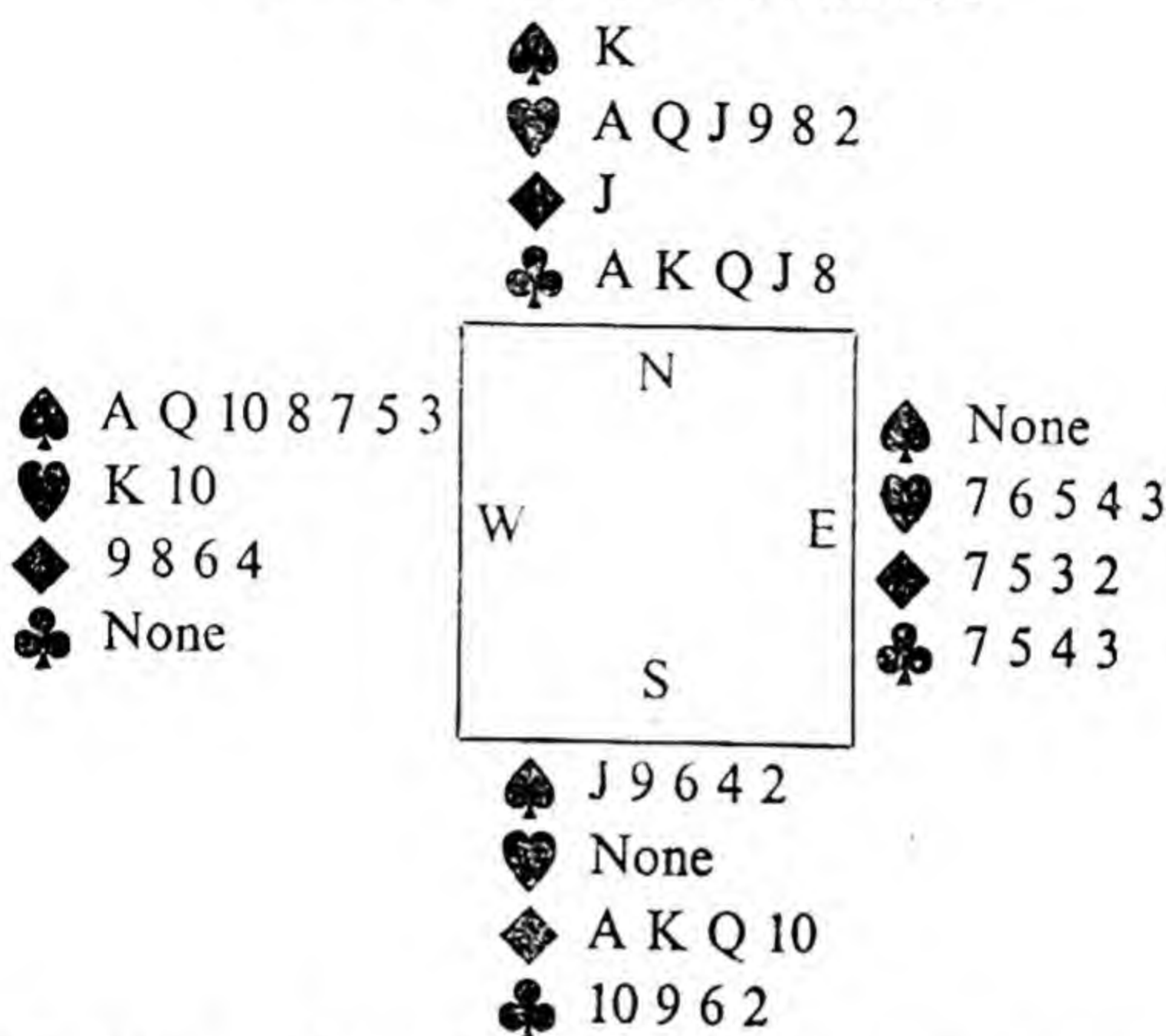
How long was the holiday?

93. TWO PLANES

Two planes, A and B, were flying to Tripoli, B travelling a mile a minute faster than A. When A was 306 miles from Tripoli, it was leading B by 35 miles; but B arrived there 6 minutes before A. What were their speeds (supposed constant)?

94. A HAND AT CONTRACT

```
              ♠ K
              ♥ A Q J 9 8 2
              ♦ J
              ♣ A K Q J 8
```

```
♠ A Q 10 8 7 5 3          N          ♠ None
♥ K 10                               ♥ 7 6 5 4 3
♦ 9 8 6 4        W              E     ♦ 7 5 3 2
♣ None                               ♣ 7 5 4 3
                          S
```

```
              ♠ J 9 6 4 2
              ♥ None
              ♦ A K Q 10
              ♣ 10 9 6 2
```

THE score was love-all. West started with a "sacrifice" bid of 4 Spades. North, "5 Hearts," and E doubled. South "rescued" with a bid of 6 Diamonds—somewhat "psychic," but not without possibilities. All passed, and West led the 9 of Diamonds. South was two down on his contract. "Good," said North; "with your hundred for honours we come out all square. We might have made a small slam in Clubs, but you weren't to know that, and it was too late for me to show them."

"As a matter of fact," said West, "South could have made his small slam in Diamonds after my lead of the 9, if he had known how the cards lay."

How could this be done?

95. KNITTING FOR VICTORY

MARY bought 3½ oz. of blue wool, 2¾ oz. of red, and 2¼ oz. of white, and knitted a victory scarf. It took 6 oz. of

wool in all, and the weight of blue wool she had over was as much as the combined residues of red and white.

Setting out to make another precisely similar scarf, she found she wanted some more wool of each colour. How much more blue wool would she need?

96. IN THE CONCENTRATION CAMP
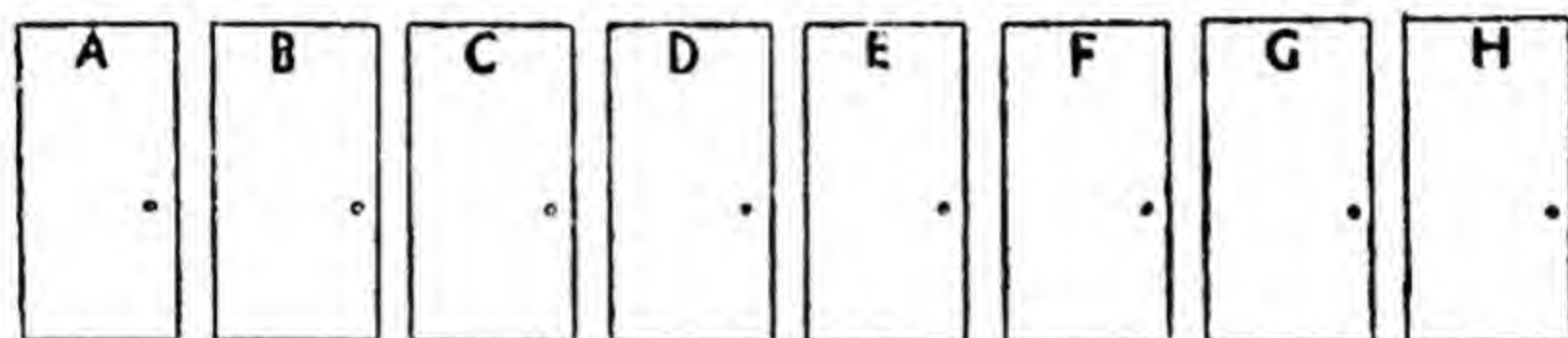
THE corridor had a metal floor, and along one side were eight doors, lettered from A to H. "You have been troublesome to me, No. 6425," said the Kommandant, "and I propose to get rid of you. Attend carefully; if you count these doors in order, beginning at A, H will be 8; then, continuing in the reverse direction, G will be 9, and A, 15; reversing again, B will be 16, and so on, till you reach your own number, 6425, when you have only to turn the handle and you will be free. But if you touch the handle of any of the other seven, it will be just too bad, for they are electrified with a voltage that will be fatal. You must act at the end of 3 minutes, without hesitation!"

No. 6425 put in some pretty hard thinking . . . and when the Kommandant said "Now!" he secured his liberation by turning the handle of—which door?

97. HOW GREEN WAS MY VALLEY?

THE Vale of Gwyrddnant, where my youth was spent, consisted partly of grassland, the rest being sandy soil, devoid of vegetation. If one-quarter of the grassland had turned sandy and one-third of the sandy had gone

grassy, there would have been an equal extent of each. How much was actually under grass?

98. EGG-SHARING

100 eggs are distributed unequally between A, B, C, D and E. A gets as many more than B as D gets more than E, and D gets as many less than C as C gets less than B. How many does C get?

99. A KNIGHT'S TOUR
(Begin at WHAT)

OF	THE	THE	TIMES	32,	OF	AS	JACK
WHEN	THREE	THEIR	AGES	OLD	WHEN	AND	JACK
ARE	SUM	AS	WILL	JILL?	IS	WAS	JILL
WAS	BE	WHAT	AGES	WAS	WAS	AND	JACK
JILL	AS	JILL	JILL	OLD	JACK	JACK	TWICE
THAN	JACK	AS	JILL	WHEN	AS	IS	IS
OLD	IS	WAS	YEAR	TIMES	AS	AS	WAS
WHEN	OLDER	AS	NOW.	OLD	A	THREE	TWICE

100. SQUANDER-BUG RAMPANT
(An old friend? No—you will find this is different.)

THREE families, each consisting of father, mother and daughter, went shopping. No two persons spent the

same amount; in each case father spent most and daughter least, and each person paid as many pence for each article bought as the number he or she bought. Each family bought 82 articles, spending respectively £10 12s. 2d., £10 10s. 6d., and £9 13s. 10d.

Mr. Fiennes bought 10 things more than Mrs. Signs, and Mrs. Lynes 10 more than Jane. Mr. Signs spent four times as much as Ann.

What was Mary's (a) surname, (b) expenditure?

101. HUNTIN' AND SHOOTIN'

WHEN a certain military unit took up its quarters in Sportshire, local enquiries into the habits of its officers resulted in this report :—"Two-thirds of them do not hunt, half of them do not shoot, one-sixth hunt and shoot, and ten neither hunt nor shoot."

How many officers were there?

102. A THOROUGH-GOING CHEESE-TASTER

MIJNHEER VAN SCUYP, paying a visit to his cheesemonger, proceeded to sample one of the spherical products of his native land. So much did he find it to his taste that the cheese, when he had finished, had a symmetrically-situated cylindrical hole or tunnel, 5¼ inches long, running clean through the middle of it.

How many cubic inches of cheese remained?

103. GAELIC GUILE

"ROBINSON," said Professor McAlgebra to a pupil, "I have drawn an irregular convex polygon and its diagonals, no three of which meet in a point within the figure. I have counted their intersections and also the number of compartments into which they divide the figure, and

the latter number exceeds the former by 15. Now I will wager as many shillings as the figure has sides that you will not tell me, in 10 minutes, what that number of sides is. If you win, you must give me my revenge by setting me a precisely similar problem on the same terms."

Robinson was successful, and the Professor handed over 7s.

"My figure," said Robinson, after a lengthy period of drawing and counting," has 153 more compartments than intersections," He smiled complacently, feeling sure that this would "stump old McA." But well within the limit of 10 minutes, the Professor gave the correct answer, and Robinson had to pay—How much ?

104. BUS SPEED

As I walk home from the station each evening, a bus overtakes me at the Greyhound. Yesterday I left the station a quarter of an hour later than usual, and the bus caught me up 1,584 yards from the inn aforesaid. If I walk at 3 miles per hour, what is the speed of the bus?

105.

WE WANT EIGHT

PLACE eight counters on the squares of a chess-board so that no two are in the same line horizontally, vertically, or diagonally, and without using any square on either of the main diagonals (marked with X's).
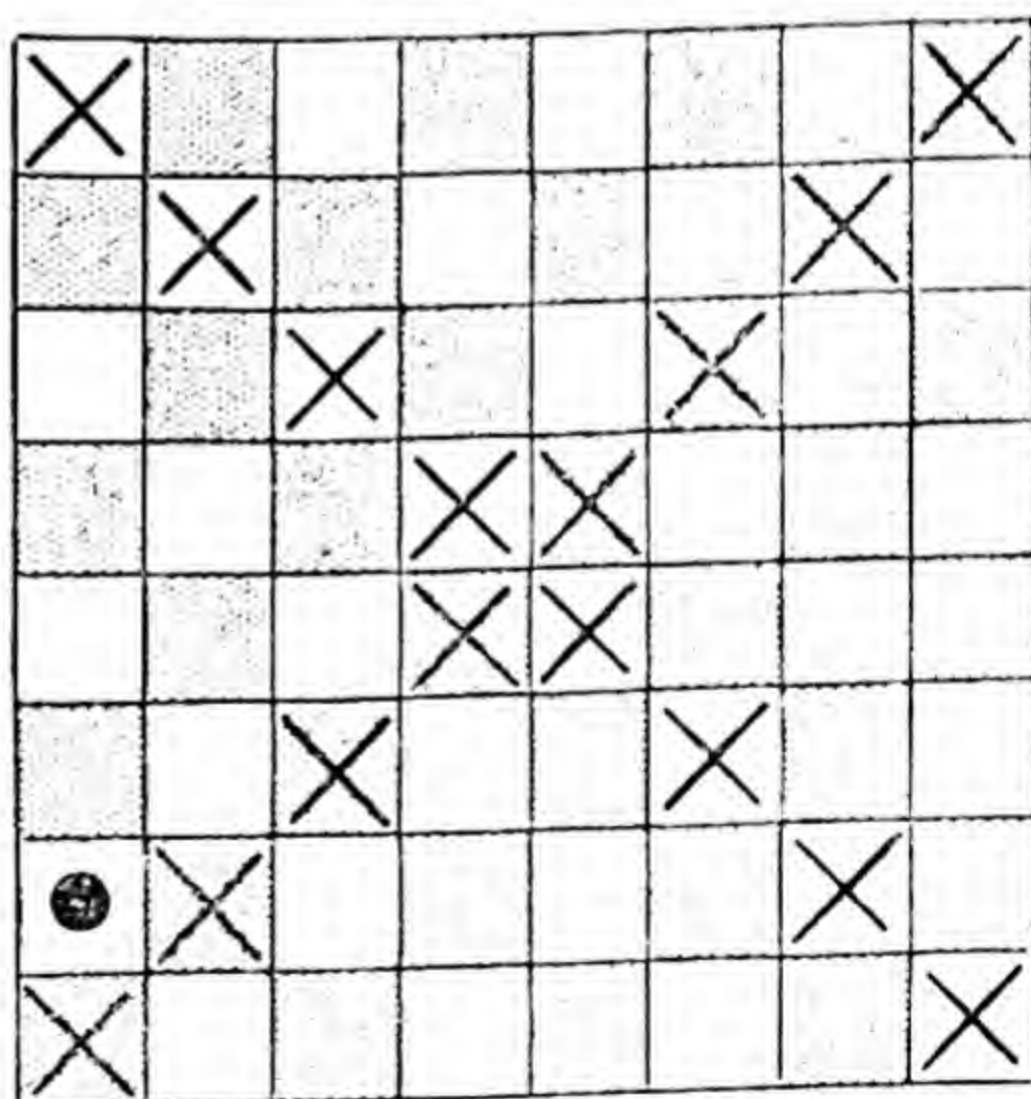
The first counter is to be placed, as indicated, in the lowest square but one on the left.

49

106. PROGRESS
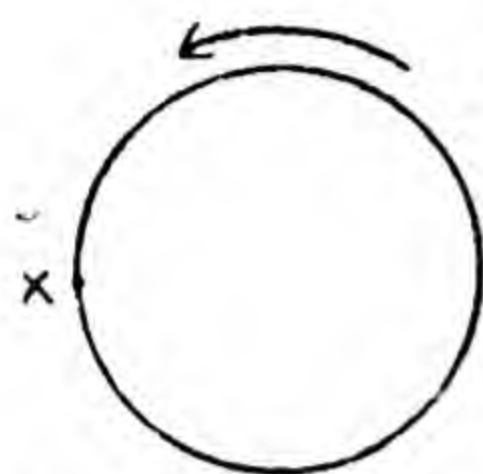
A BOY has a hoop of 28 in. diameter. Before starting to bowl it in the direction (right to left) indicated in the figure, he makes a mark on the farthest forward point of the rim, at X. How far forward will X have gone when the hoop has made half a revolution? (Take circumference as $3\frac{1}{7}$ times the diameter.)

107. ALLOTMENTS
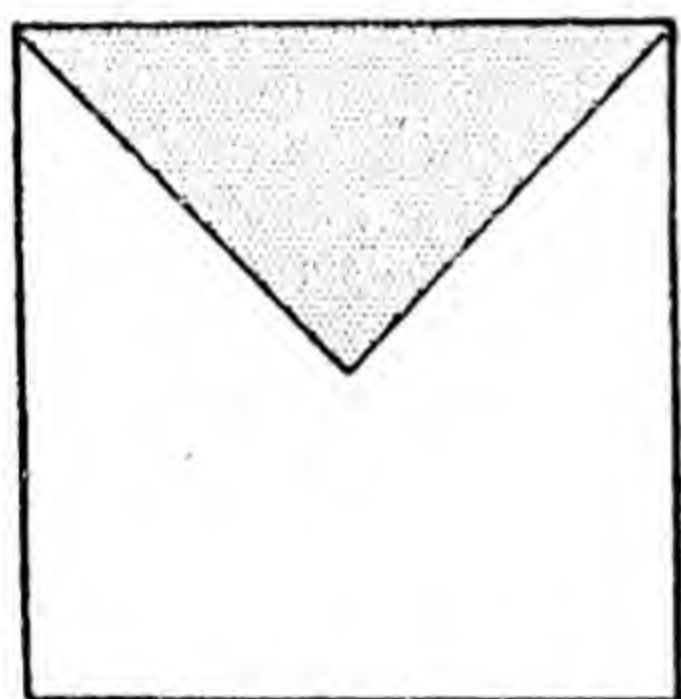
SMITH owns a square area of 10,000 sq. yds. of cultivable land. Retaining a triangular piece, one-quarter of the whole, for himself, he has let out the rest in equal shares to four neighbours. Each of their portions is of the same shape and has a continuous boundary.

Can you draw a diagram showing how the land is divided?

How much longer than the boundary of Smith's reserved portion (shaded in the diagram) is the boundary of each tenant's allotment?

108. CROSS-NUMBER PUZZLE

ACROSS

1. 1 *down* after 9 *down*.
6. A cube.
7. Square root of 1 *across*.
8. Doctor's pet number.
9. Multiple of year when a

County side got out for 12.
12. Sum of 9 *d.* and 11 *d.*
13. Multiple of 3 *down*.
14. Sum of digits of 1 *ac.*

DOWN

1. Differs by 1 from 9 *d.*
2. Multiple of 14 *across.*
3. First half of 9 *across.*
4. All 4 digits the same.
5. Prime number.

9. Its only prime factors are 2, 3, 11.
10. 5 *down* reversed.
11. Prime factor of 4 *down.*
12. Multiple of 14 *across.*

109. COINS

IN paying a bill of £1 11s. 4d., I used 30 coins which consisted of half-crowns, shillings, and pence. How many were there of each denomination?

110. LINERS

THE *Bubonic* and *Semantic* leave Liverpool and New York alternately every 12 and 18 days respectively. If they leave Liverpool together on a certain day, after how many days will they next leave (*a*) Liverpool, (*b*) New York, together?

111. POTTER'S INTELLIGENCE TESTS

IN this batch of questions, paper and pencil *may* be used, and Potter's time limit is 10 mins. for the whole set.

1. In how many different arrangements can four bridge players seat themselves at a table where the chairs are labelled N. S. E. W. ?

2. On the far side of the road are lamp-posts at 33-yd. intervals; on my side trees are planted at intervals of 18 yds. 1 ft. Where I am standing, a tree is exactly opposite a lamp-post.

    How many yards must I walk to get to another tree directly opposite a lamp-post ?

3. How much earth is there in a cylindrical hole which has been dug in the ground to a depth of 4 inches, and with a diameter of 3 inches ?

4. (*a*) Add these numbers together: 11, 6, 1, 9, 12, 0, 3, 7, 8. (*b*) Multiply them together.

5. What is the sum of a third of a third or sixpence and a third of a third of a third of ninepence ?

6. What is the weight of a child which weighs 3 stone and a third of its own weight ?

7. Brothers and offspring have I none,
    But my father's grandson is John's father's son.
    What relation, if any, is John to me ?

112. REFLECTED TIME

WE usually judge clock time by the position of the hands, ignoring the figures on the dial.

An observer, looking at the reflection of a clock in a mirror and taking it to be the actual clock, sees the hands as in the diagram, and reads the time as "nearly 22 minutes past 4."

What is the time actually indicated by the clock ?

113. TILES

A COURTYARD, which measures 14 yds. 1 ft. 11 in. by 6 yds. 5 in., is completely paved with square tiles of the largest possible size. How many tiles are there?

114. DESERT TACTICS

A MOBILE force under Major Sandys moved S.W. from Mukmuk to intercept an enemy transport column at Khan Tsimi. Failing to make contact there, it continued in the same direction to Bakh Aghen, 43 miles from Mukmuk. Thence, hearing that the enemy column was heading W.N.W. from Khan Tsimi towards Zi Saïd, a coast town 64 miles due West of Mukmuk, Sandys went N.N.W. to Sidi Mafar, on the enemy's line of march, only to find that he had already passed that point.

Sandys now wanted to know the distance from Sidi Mafar (not marked on map) to Zi Saïd. Being unable to use trigonometry, he took the distance from Khan Tsimi to Zi Saïd from the map as 49 miles (which was practically correct), and by simple geometry found the distance he wanted. What was it?

115. HOW OLD?

FIVE friends met one evening for bridge. Five rubbers were played, a different four playing each rubber.

The sum of the ages of those taking part in each rubber is 142, 136, 130, 128, 124 years.

What were the respective ages of the players?

116. HOUSING ACCOMMODATION

IN each of three roads, A, B and C, the houses on one side have consecutive odd numbers (beginning at 1),

and on the other consecutive even numbers (beginning at 2). In each road the sum of the odd numbers is greater by 43 than the sum of the even numbers; A contains most houses, and there are six more even-numbered houses in B than there are odd in C.

How many houses are there in each road?

117. MAIMED SCALES OF NOTATION

MBOMBO and Njinja, heroes of many fights, were both short of their full complement of fingers. ("Fingers," by the way, throughout this narrative, must be taken to include thumbs.) Their arithmetic teacher at the Mission told the class to count up to the final finger, and carry one to the next place for every set so completed. Our two friends, faithfully carrying out instructions, found that their systems of numeration differed, not only from the normal, or decimal system, but also from each other. Thus, Mbombo wrote a certain number 215, while Njinja's version of it was 341.

How many fingers remained to each warrior, and what was the said number?

118. OVER-DOUGHING THE DOUGHBOY

AN American soldier, to whom x dollars y cents was due, received a cheque for y dollars x cents, the figures having been inadvertently transposed. He cashed the cheque, and spent 3 dollars 50 cents.

If there still remained a sum twice as great as the amount he should have received, what was that amount?

119. BATLEY'S AVERAGE

THE last match of the season, a whole-day affair, was about to begin. Batley told me, just before he went in

to open the innings, that his average so far was 31 "without any not-outs to help it," and that he felt like making a big score. But alas, he was run out, early in the proceedings, for 7. However, after lunch he made 55 before a catch in the deep field ended his second innings. This made his average better by 2 than it had been at lunch-time.

How many innings did Batley play during the season?

120. A GEOMETRICAL DOODLEBUG

CAN you score a direct hit on this innocent-looking, but rather deadly, bit of Geometry—in other words, give a strictly Euclidean proof (without recourse to *reductio ad absurdum* methods) of the following :—

"If the angle-bisectors, BE and CF, of a triangle ABC are equal, the triangle is isosceles."
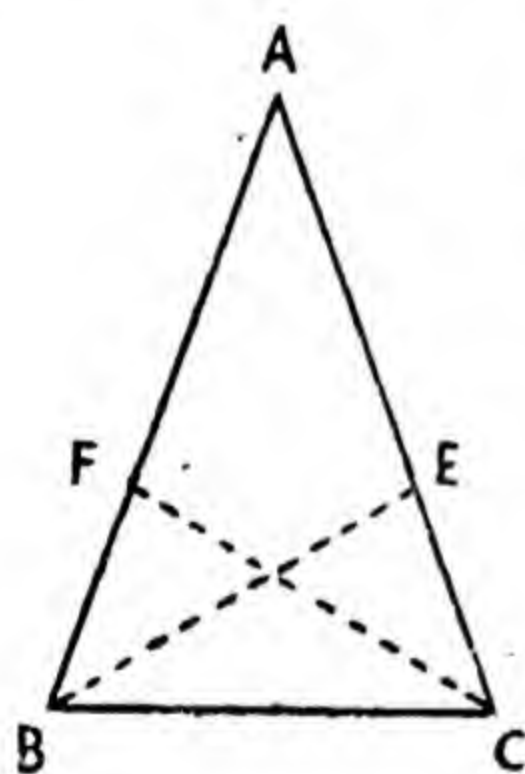
Some years ago, a widely-circulated weekly invited a direct proof from its readers; but though several indirect proofs were sent in, a direct proof was not forthcoming. Nor, to the best of our knowledge, has any such proof appeared hitherto.

However, one will be found on page 129.

WORD AND LETTER PROBLEMS

121. STOP THE GAPS

THE words missing can be filled with the names of places in England so as to make sense. (For example, Our prospects Brighton (brighten) as the days go by.)

1. Customer : Do you —— ?
   Innkeeper : No, sorry, only ——.
2. (From the kitchen front) . . . then —— in the oven and ——. Be careful not to ——, for —— pies are not —— with any enjoyment.
3. (Unsympathetic wife to husband with a cold.) If you —— —— next your skin, you'd stop ——.
4. An amateur farmer puts my —— when he boasts, "—— one who —— about ——." It's —— to argue with people who, through —— stupidity, —— discovered their own shortcomings.
5. Though the enemy's fleet were able to —— for a time, we felt sure that our —— eventually bring them to ——.

The names of the places are included in the following list :—

Chard, Islip, Wool, Bacup, Clapham, Woore, Ringwood, Stoke, Eyam, Beer, Leeds, Eton, Kew, Cowes, Fleetwood, Havant, Lancing, Bakewell, Idle, Staines, Sandwich, Hyde, Dulwich, Crewe, Stockport, Burnham, Barking, Gnosall, Battle, Shere, Bath, Andover.

122. GENERAL-KNOWLEDGE TEST

CAN you state and "solve" this equation ?

The articles less the sum of the labours of Hercules, the parts of Gaul, the lamps of architecture, the men in a boat, and the fell swoop are equal to the product of

the little piccaninnies and the feathers less the product of the bears and the points of the law.

123. FOUR CONSONANTS

SUPPLY the missing letters so that four six-letter words may be read—two across and two down. The thirteen letters to be supplied consist of four consonants only, three of them appearing three times each and one appearing four times.

124. FIND THE GENERAL

WHEN you discover the correct words to fit these clues, you will see that the initial, middle, and final letters spell out the name of a great General.

1. Choked.
2. A bequest benefits him.
3. Derbyshire village whose delightful garden is a primary consideration.

125. LITERARY NUMERALS

THE numerals One to Ten appear in the following lines, all taken from Shakespeare or Wordsworth. Can you place them correctly?

1. *Full fathom —— thy father lies.*
2. *Upon a lie —— times removed.*

3. *A —— years' darling of a pigmy size.*
4. *—— thousand saw I at a glance.*
5. *—— years she grew in sun and shower.*
6. *No, make it two more : let it be written in ——*
   and ——.
7. *Weary se'nnights —— times ——.*
8. *—— voices are there. One is of the sea.*
9. *The —— only dwelling on earth that she loves.*
10. *Ay, ——, in buckram suits.*

126. MIDDLES

THESE fragments are the exact centres of words, and in each instance they require two letters before, and two after, to form the word :—

1. -CHYDE-		6. -OPHTHE-
2. -CKNA-		7. -APWE-
3. -CHS-		8. -BPOE-
4. -EUEI-		9. -LISM-
5. -NKAJ-		10. -THHO-

127. TWO SMART GIRLS

HERE are clues to 5 five-letter words, the diagonals of which form two girls' names :—

1. Wanderer. 2. Fabric. 3. Weighty animal. 4. Impudence. 5. Kind of falcon or horse.

128. CONTRACTING WORDS

GIVEN the word COUNTERPOISE, you are to remove any one letter and to rearrange the remaining letters to form a word. This word is then to be similarly treated, and so with all successive words, until, after eleven such steps, all that remains is the word O.

129. WORD SQUARE

THESE twelve words are to be split into six pairs, so that each pair may be rearranged to form a six-letter word. When the right words are formed, they will make a word square.

TIRE, SPAR, DEER, SPUD, OIL, POT, ORE, TIE, ME, IT, AT, TO.

130. FIND THE TOWNS

SIX English towns are here for you to discover. The clues are, first, to a word which consists of one or more letters at the beginning and one or more letters at the end of the name; and, second, to a word the letters of which have to be *rearranged* inside the first word. Thus *companion* containing *scrap of cloth* would stand for *mate* and *rag*, which would bring us to *M-arg-ate*.

1. *Kind of friar or elephant* containing *strong gust.*
2. *Domestic vessel* containing *mass of cast metal.*
3. *String* containing *visible combustion.*
4. *Sponge* containing *upper edge.*
5. *Point of compass* containing *obscure.*
6. *Malign sidelong glance* containing *quotes.*

131. SHUFFLED LETTERS

EACH of these sentences has a missing pair of words which are anagrams of each other. All the words are 9-letter ones.

1. Some supporters of the —— Bill need to be —— against expecting an immediate millennium.
2. I have been —— the history of the —— Guards.
3. He —— an entertainment which was planned on a rather —— scale.
4. —— was his best subject, but by some —— he failed in it.

132. LITERARY JIGSAW

WHO wrote the works in the list printed below? When you have discovered the names of the authors, they are to be fitted into the diagram in the manner of a crossword puzzle. The answer to No. 1 has already been filled in, and you will see that the E (in MILNE) crosses one in the name of the author of No. 2, whose name similarly links up with that of the author of No. 3, and so on.
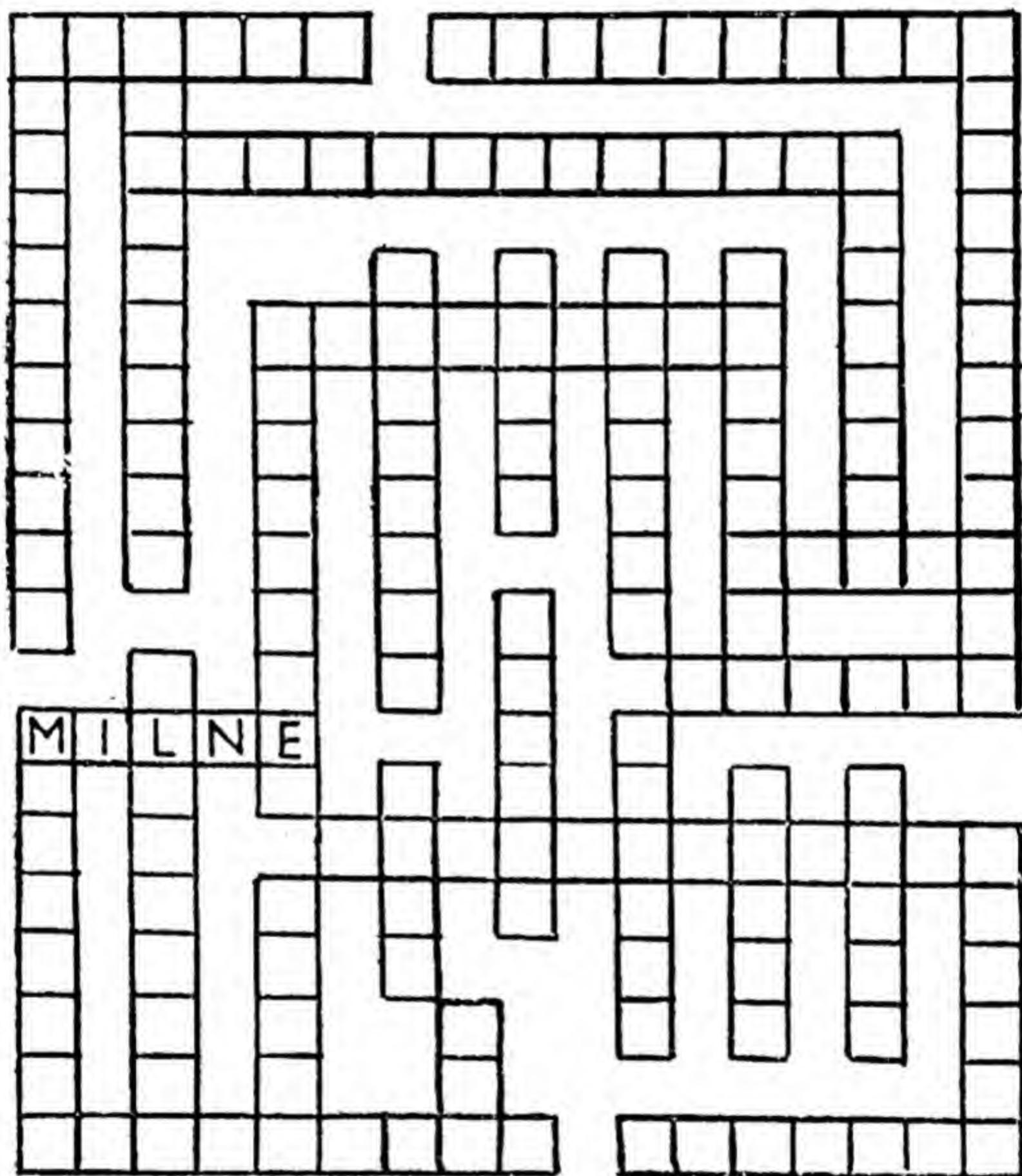
1. *When We Were Very Young.*
2. *Confessions of an English Opium Eater.*
3. *Trilby.*
4. *Roderick Random.*
5. *The Count of Monte Cristo.*

Aee No4640

6. *Wee Willie Winkie.*
7. *Barchester Towers.*
8. *Three Men in a Boat.*
9. *The Four Just Men.*
10. *Rodney Stone.*
11. *Under Two Flags.*
12. *Scaramouche.*
13. *Night Must Fall.*
14. *Cavalcade.*
15. *The Pilgrim's Progress.*
16. *Pygmalion.*
17. *Gone with the Wind.*
18. *How Green was my Valley.*
19. *Lorna Doone.*
20. *Robinson Crusoe.*
21. *The Beggar's Opera.*
22. *Rock of Ages.*
23. *The First Hundred Thousand.*
24. *Sorrows of Satan.*
25. *Essays of Elia.*
26. *On the Origin of Species.*
27. *The Thirty-nine Steps.*
28. *The Scarlet Pimpernel.*
29. *Murder in the Cathedral.*

133. IN REVERSE

SOMETIMES a word can be changed into another by reversing the order of the first two letters, as *rat, art ; potion, option.* In the following sentences the missing words are such pairs :—

1. The question is bound to —— how we are to —— more money for social needs.

2. Her first —— part was at the opera-house in ——.

3. In mediæval days —— edicts often used to —— those who had made themselves enemies of the Church.

4. It is no —— to —— a man who is bankrupt.

5. The Minister's speeches —— attention by that —— of qualities—precision combined with vigorous expression.

6. In some —— it is easier than in others to fly at high ——.

134. SHAKESPEARE CHARACTERS

THE strange names which follow are made up from the names of one male and one female character in

the same Shakespeare play. The five plays from which these pseudo-parents are drawn are some of his best known.

1. IDA LORNA MASON. 4. MARION ROCHES.
2. ACACIA SPROT. 5. EDGAR M. DUNNE.
3. VIOLA LE RICE.

135. WORD CHAIN

PROCEED from TAMIL to IDEAL according to these instructions. The words in between are to be four in number—all 5-letter words; the last two letters of *tamil* are the first two in the second word, and so on to the end of the chain; the central letters of the chain, read downwards, form a significant word.

136. SHUFFLED LETTERS

THREE sets of three anagrams have to be found to fit into the following :—

1. While we —— in the ——, my companion said, "If nothing —— us, we shall reach Cairo by September."

2. When —— wakes,
    And —— takes,
    'Gainst blackout fate
    He 'gins to ——.

3. The General called his —— —— to hear their ——.

137. SPURIOUS WORKS

THESE titles and names are counterfeit. They have been arrived at by taking a genuine title and the name of its author, mixing the letters thoroughly, and rearranging them to form these imaginary works:—

1. *Shy and Dry*—S. H. Tate.
2. *Camera Lies*—Ed. Fogs.

3. *Dusty Men*—Anon.
4. *His Only Gamp*—A.W.
5. *Show a Leg*—Wendy Kirst.
6. *Sherry and Cake*—M. T. Honey.
Can you sort them out?

138. LITERARY RIVERS

CAN you name the missing rivers?

1. *The River ——, deep and wide,*
   Washes its wall on the southern side.
2. *And dark as winter was the flow*
   Of ——, rolling rapidly.
3. *Where ——, the sacred river, ran.*
4. *Down the swift —— to the Lesbian shore.*
5. *Wha'll buy my caller herrin'*
   New drawn frae the ——?

139. FORE AND AFT

PLACE three letters before, and the same three letters —in the same order—after these fragments to form words:—

1. —O—   3. —IZAT—   5. —ICIP—
2. —TO—   4. —ICEM—   6. —ELIVE—

140. WORD LADDER

TURN PAPER into BOOKS, changing one letter only at each step and making no change in the order of the other letters. It is comparatively easy to do this with seven changes, that is, with six intermediate steps. Can you do it with only five intermediates?

141. SCRIPTURAL NUMBERS

THIS problem entails some Biblical research. You are

required to establish the numbers to fit this equation:—

The number Samson killed with an ass's jawbone plus *Abram's servants armed to rescue Lot* plus *the months Moses was hid* plus *the measures of barley Boaz gave Ruth* plus *the beasts round about the throne* equals *the prophets of Baal ordered by Elijah to be assembled* plus *Pharaoh's chosen chariots in pursuit of Israel* plus *the age of Moses when he died* plus *the singers who came out of Babylon* plus *the years Æneas kept his bed* plus *the sparrows sold for two farthings.*

142. FIND THE NOVELIST

THE letters in the two names of an English novelist have been rearranged to form words which fit into each of the following sentences. Who was the novelist? And what are the missing words? The number of letters in each word is indicated.

1. The housewife is advised to put coal ashes on her fires, but what can she do should (3) (4) (7)?

2. There is no prospect of there being any additional sweets or (5) for the (9) party.

3. (8) (3) a source of (3)—not to mention eggs—to those who have room to keep them.

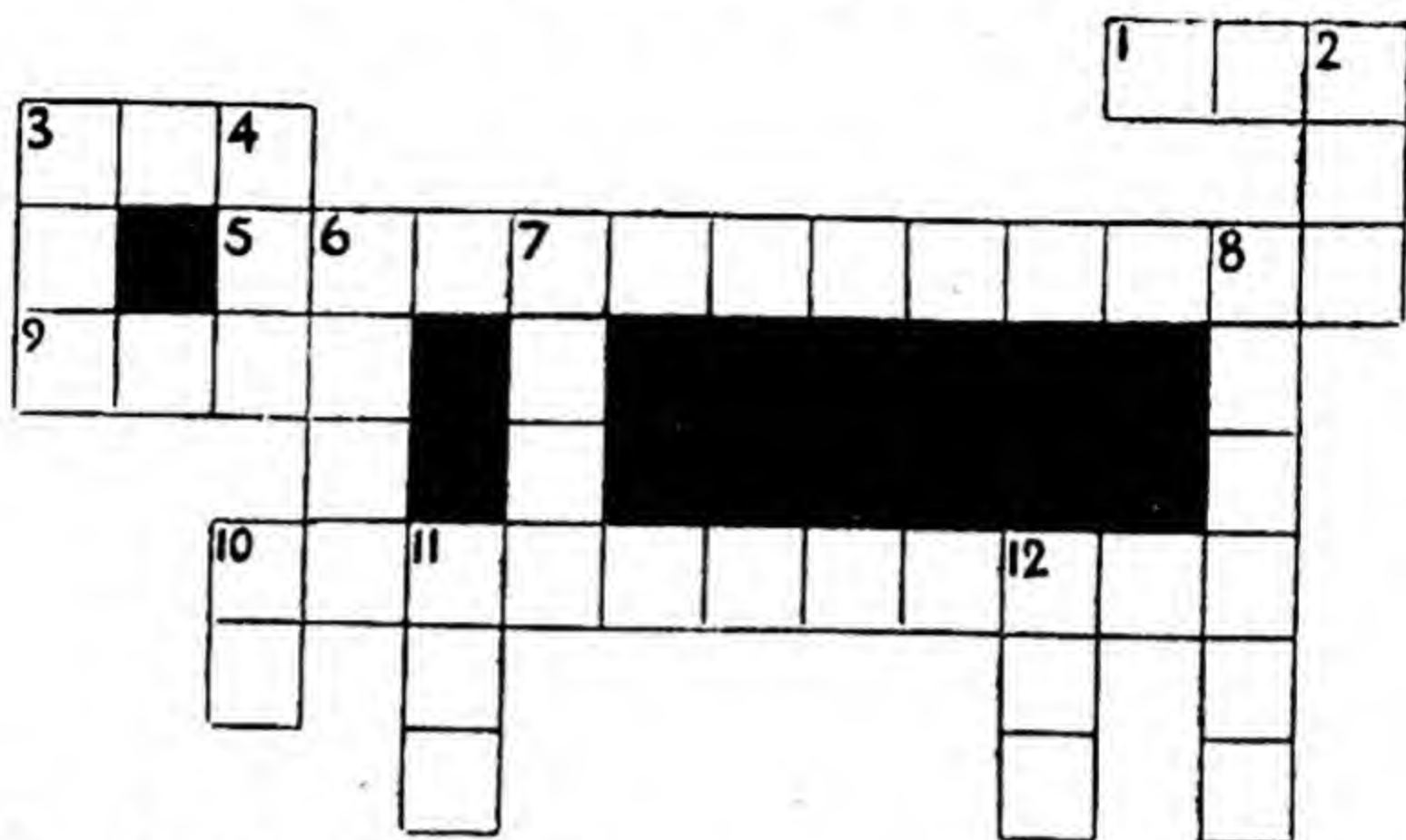### 143. MAINLY ZOOLOGICAL

Across :
1. Snake or feather.
3. Greedy person.
5. Elephant's characteristic (*two words*).
9. Dejected.
10. They give you the hump.

Down :
2. Stupid fellow begins to make violent attack.
3. Kind of dog that's snubbed.
4. Antelope—not old, apparently.
6. Saracen prince.

7. Short examination.
8. Turn back less at making an ornament.
10. Repeated an extinct bird.
11. Wise bird.
12. Little devil !

144. LINKED WORDS

HERE are five words for you to discover, leading to a sixth which we give you. Each word is formed from its predecessor by changing one letter, and re-arranging.

1. BRITISH TOWN.
Change K to A and get:
2. VERB.
Change G to S and get:
3. VERB.
Change E to N and get:

4. ADVERB.
Change N to R and get:
5. NOUN.
Change R to N and get:
6. TRANSIENT.

145. HIDDEN NAMES

ALL the words "buried" here are Christian names, and are to be found in the consecutive letters of two (or sometimes, more) words. Thus, He used to com*pete* *r*egularly (Peter).

1. A well-cultivated garden is a joy to me.
2. The greatest heroes of a nation are usually those who first made it a leading race.

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3. I've never had a grand slam yet.
4. That she should take his part hurt me most.
5. My doctor doesn't realise how ill I am.
6. The pacifist declared war did not settle anything.
7. Decorations may be given for courage or general efficiency.

146.

LOOK AGAIN

How many squares are there in this diagram ?
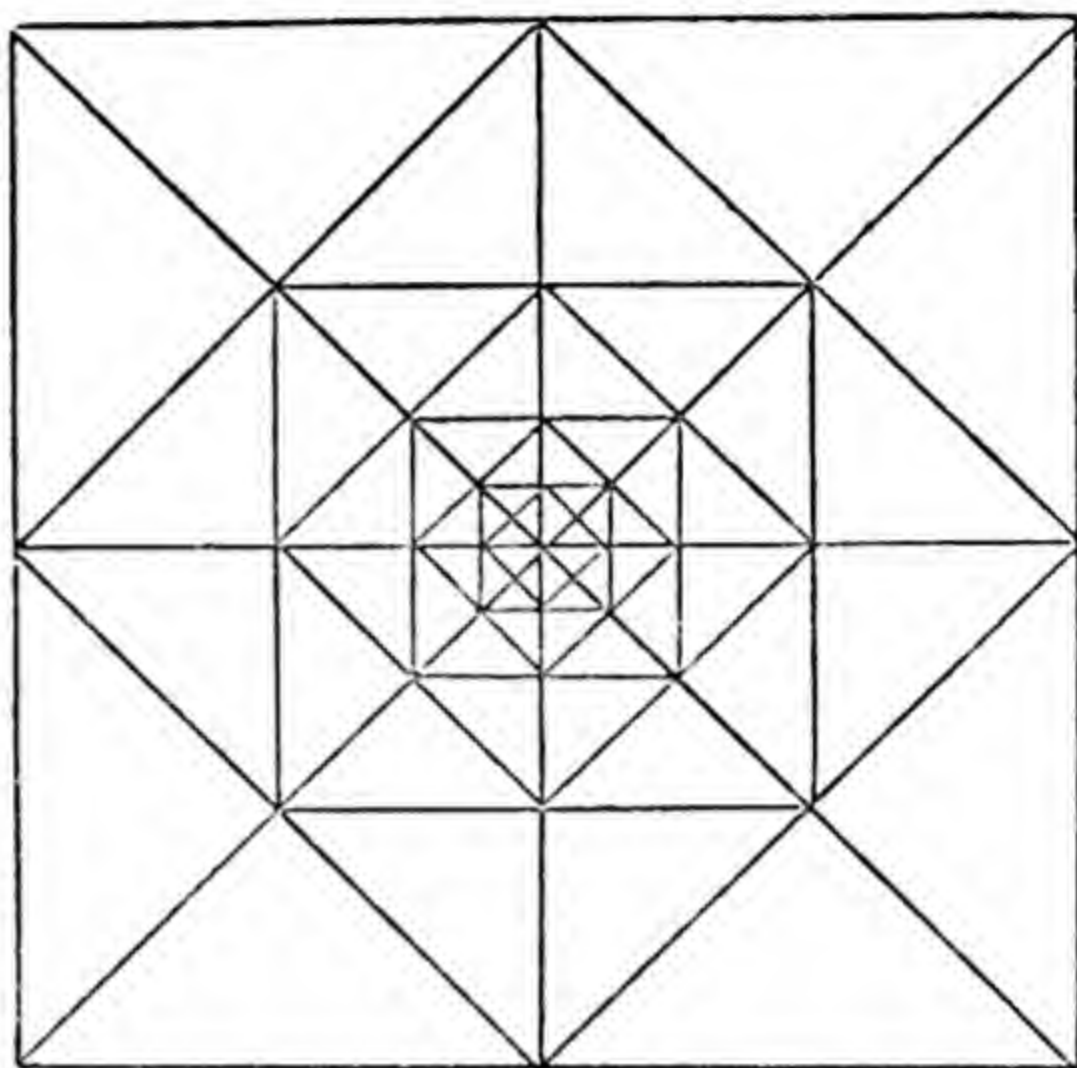
147. TRUTH TEST

AN island is inhabited by two distinct races, indistinguishable in speech and appearance, but differing radically in two ways: one race lives in caves and always speaks the truth, the other lives in trees and invariably lies.

A stranger landing on the island met three of the natives. He asked A: "Which race do you belong to ?" Failing to catch the reply, he asked the others what A had said and received these answers:

B: "A said he was a tree-man."

C: "A said he was a cave-man."

To which race did B and C respectively belong?

148. MR. AND MRS. SPRAT

HERE is a new version of the story of the ideally comple-

mentary couple, based on a keyword of 10 letters, numbered 1, 2, 3, ... 0.

Jack Sprat, 7493 349743, 297 9 145743 85143863 957 29147 0937 but 976347 0495. His 87490 wife 297 56 14412 957 0691247 0495; so 124 451834 785543 391865 was 95582809147.

149. LITERARY JIGSAW

INSERT in the squares of the diagram the following titles: JANE EYRE, CLAYHANGER, A LAODICEAN, LORNA DOONE, SHE, MACBETH, CAVALCADE and four unnamed titles—novels by Stevenson, Kipling, H. G. Wells and George Eliot.
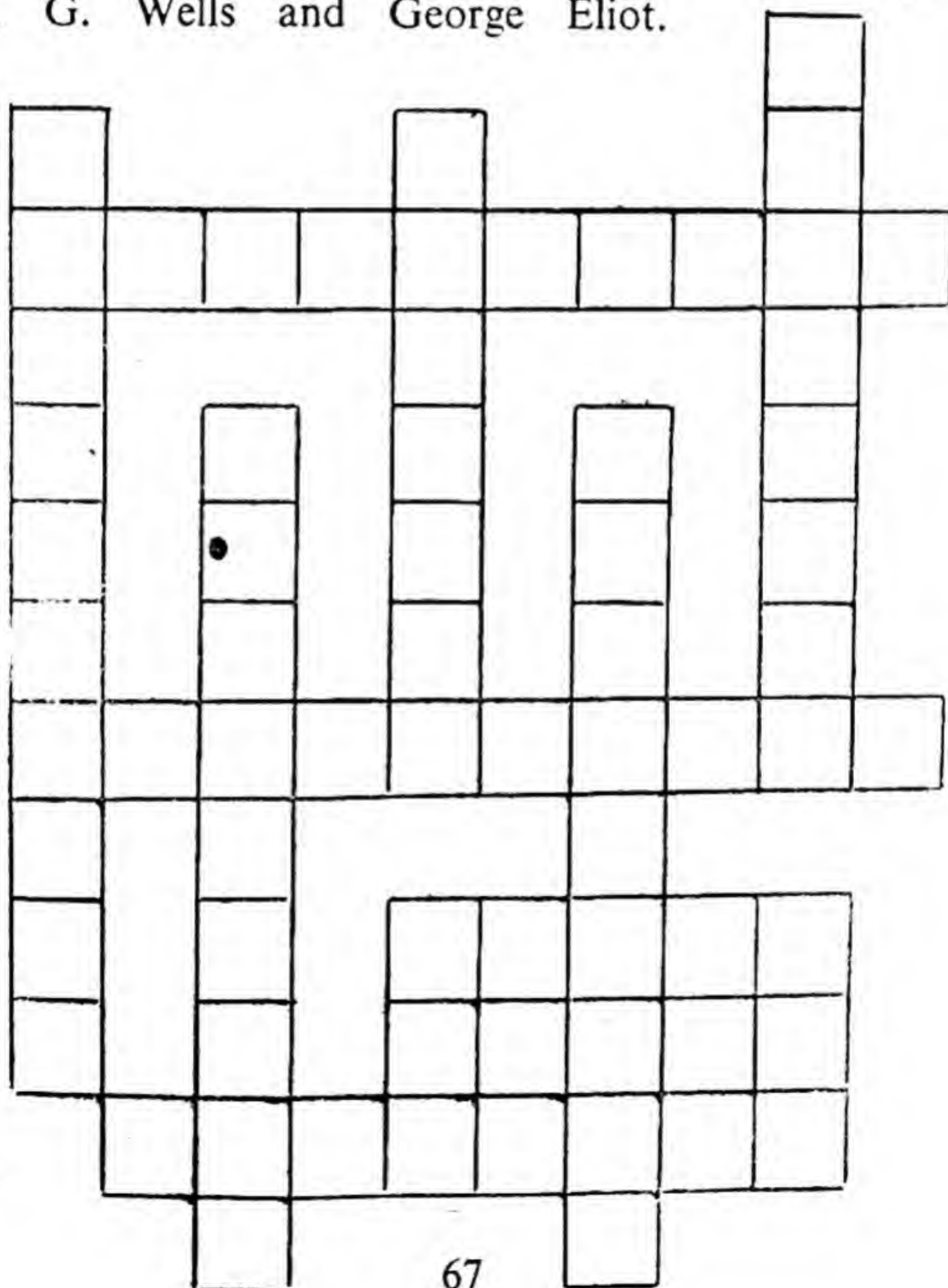
150. ALPHABETICAL

ADD to each of these thirteen four-letter words two letters, and so form a new word. Thus, from the first you might form *sample, marvel, lament,* etc. The point of the problem is that you are to use different letters for each word, so that at the end you will have exhausted the twenty-six letters of the alphabet.

LAME, IRON, TAPE, NOSE, AUNT, FIFE, TALE, YEAR, REAM, TINY, RAID, TOIL, HOLE.

151. PROTRACTED WORDS

FROM each group of two words, form a word of the length stated, using any of the given letters as many times as may be necessary, but no others. (For example, THE NAIL makes a word of 10 letters would be ANNIHILATE).

1. HOT ACE makes a word of 9 letters.
2. ONE CART makes a word of 11 letters.
3. SIT ROUND makes a word of 11 letters.
4. URGED ON makes a word of 11 letters.
5. SLUM TOY makes a word of 12 letters.
6. MORTAL SIN makes a word of 15 letters.

Clues (not necessarily exact definitions), in disorder, are: violently, a pain, secret, focus, diligent, an ideology.

152. ALPHABETICAL CROSSWORD

THE 26 letters of the alphabet all appear once, and once only, in these squares. The clues, given below, are in no particular order, but the number of letters in the word is indicated in brackets.

Footwear (4). Irritate (3). Boggy (6). Cat's is a tool (3). Firework (5). Cap for a Turk (3). Discarded material (4). I must have this above (3).
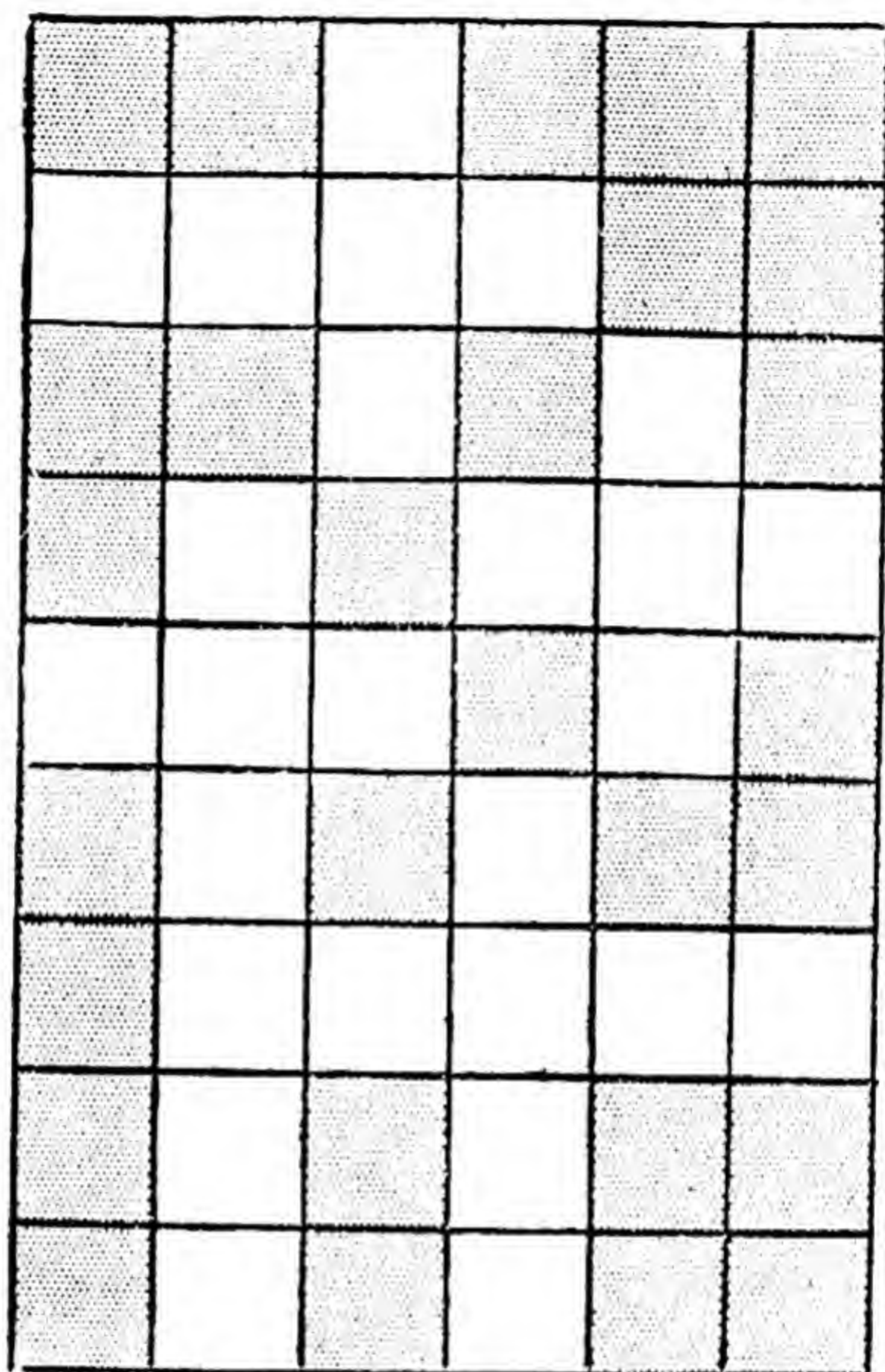
153. EXPANDING WORDS

EXPAND A into GREATNESS by adding one letter at each step and forming a word. You may make any changes you like in the order of the letters.

154. WHICH?

THE following are the 10 words needed to complete the sentences below. Assign each to its appropriate place.

BRANCH, RAKE, TEAR, BALANCE, COMPLETE, FORK, NERVE, UTTER, SIGH, RIP.

1. One of the most useful garden implements is a . . .

2. This is where the roads . . .

3. She paid her former friend only the passing tribute of a . . .

4. Climbing a tree, he lost his . . . on a high . . . and fell.

5. The treasurer has not been able to . . . his accounts.

6. His loose way of living led people to regard him as something of a . . .

7. He wore an expression of . . . misery.

8. The dressmaker's first job was to . . . out the lining.

9. He was charged with an attempt to . . . base money.

155. CAPITAL

FILL in the squares to make (across) the names of seven European capitals, each, as you see, containing six letters. Some of the letters are already printed in.

But that's not all there is to it. The first name must have one letter which is the same as the one in a similar position in the second. Likewise the second and the third; the third and the fourth; and so to the end.

156. THE LADY OF RIGA

THIS is a new version of the story of the daring young lady who chose a strange mount. It is based on a key-word of 10 letters numbered 1, 2, 3, ... 0.

A 054896 71 71075 0987390 to 3254 21 a 6721988— 51 200 7095, 3539 even 71 891896988 420931 4570918. 219 4231 the 658879 8500698 the 517456 510 8566798 forth. The 3709 91090 at 1221, 450942789669 718709, 510 a 893919 84769 21 the 67218 0756.

157. WORD LADDERS

CHANGING only one letter at a time, turn (1) SOLO into DUET in 6 moves (5 intermediate rungs), and (2) FOUR into FIVE in 7 moves (6 intermediate rungs). The order of the letters must not be changed.

158. CHRISTMAS JIG-SAW

WHEN you have discovered the answers to the clues below, they are to be fitted into the diagram, in the manner of a cross-word puzzle.

The answer to No. 1 has already been filled in, and this links with No. 2, and so on progressively.

The number of letters in each word is given in brackets.

1. Tiny character in a Christmas book (3).
2. Creates harmony at this—and other—seasons (5).
3. Most popular Christmas personage (10).
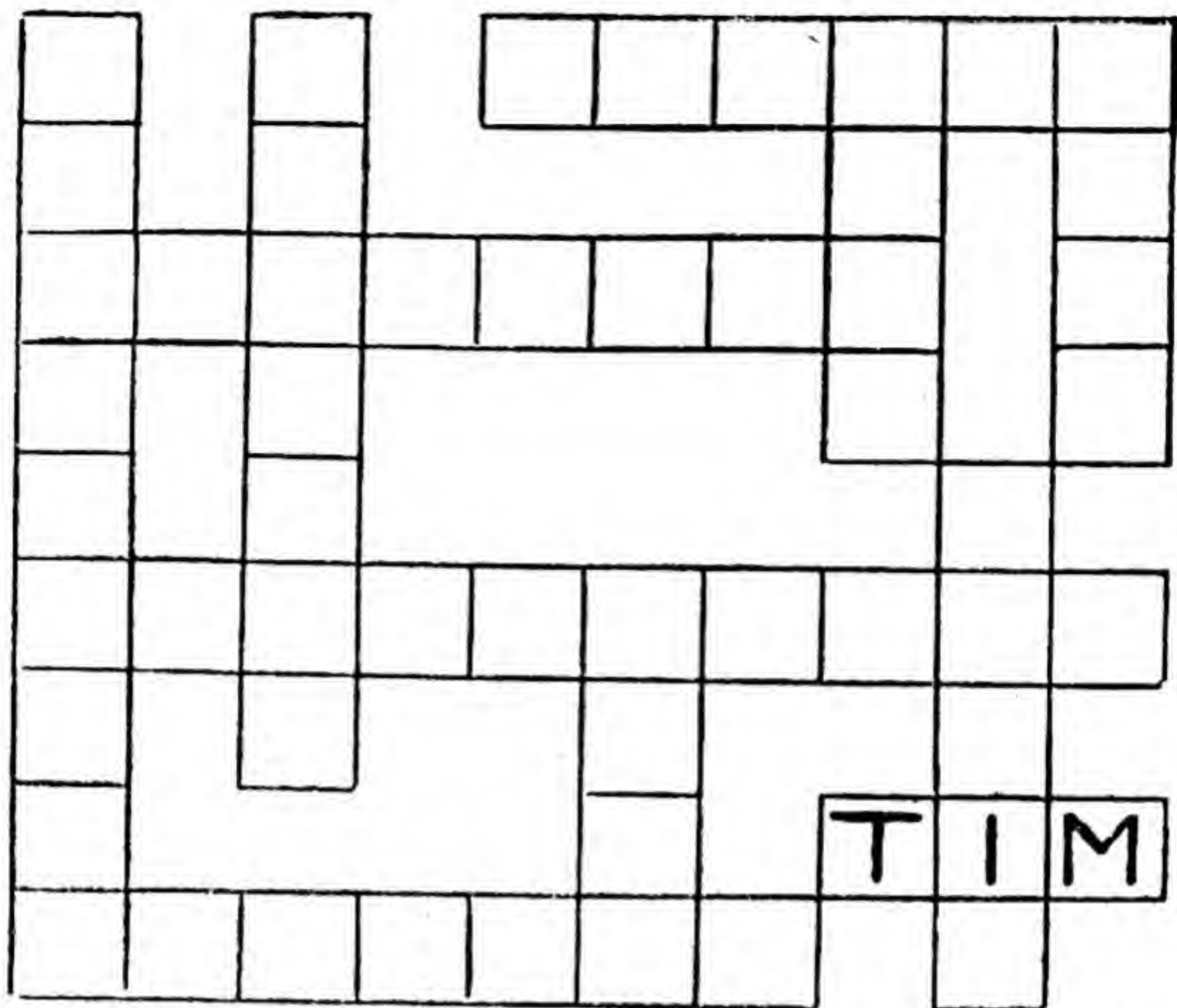
4. Toothsome accompaniment of Christmas (4).
5. Feast in a carol (7).
6. A Christmas king (9).
7. Saint who gave rise to the name of No. 3 (8).
8. Creator of No. 1 (7).
9. Under the mistletoe (4).
10. Get the bird (6).
11. Christmas season (4).

159. CANCEL OUT

You are invited to do some letter-juggling with the name of a bird and the name of a quadruped. With PARROT as an example of the first, and OTTER of the second, the process is to remove the letters common to both, by cancelling out—in this instance R, O, T, leaving P, A, R, T, E, from which the word PRATE is formed. (Note, only one R is cancelled in PARROT because OTTER

holds only one.) Below are given eight words formed by a similar procedure, the names in each instance being that of a bird and of a quadruped.

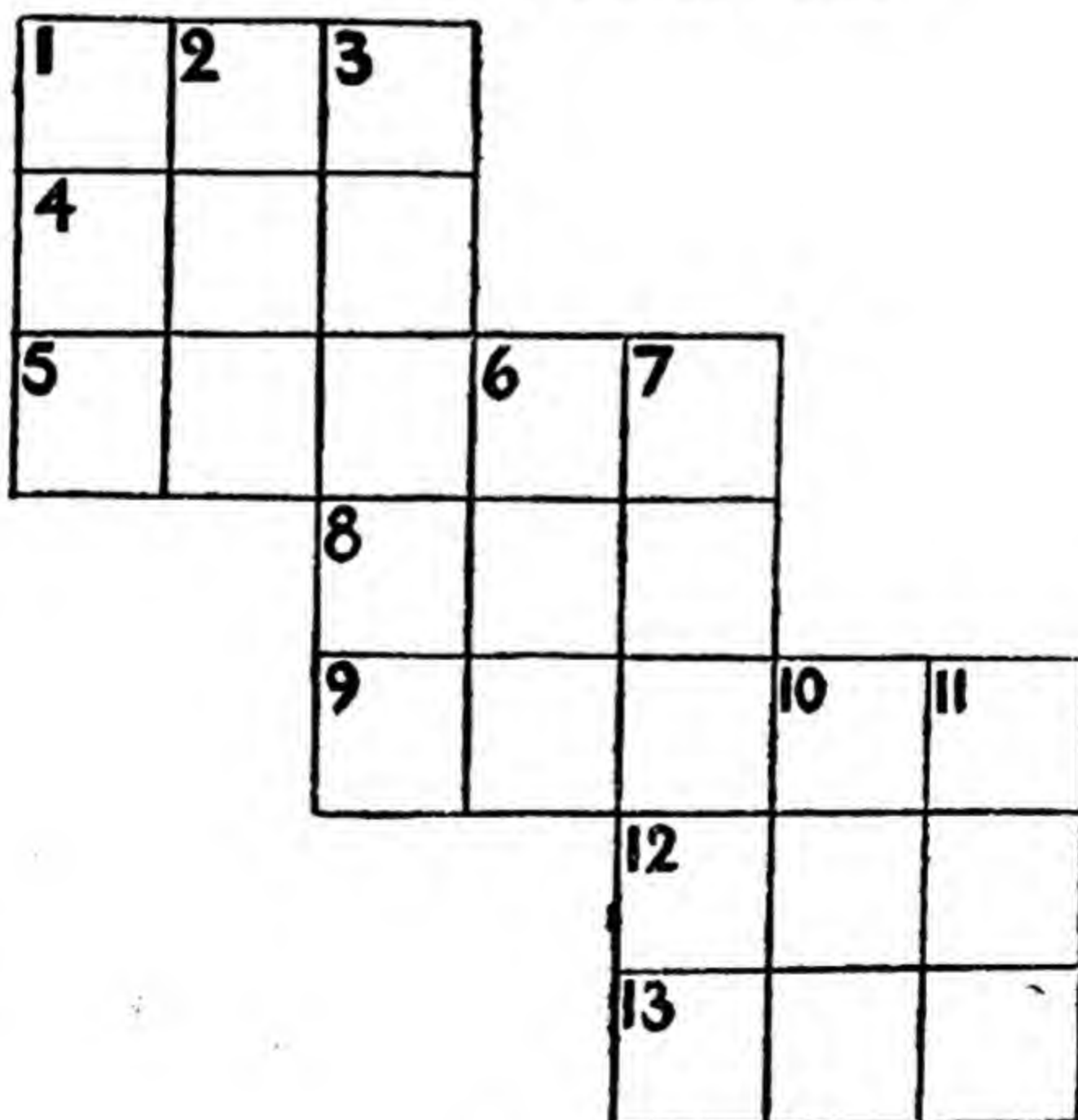|			
1. MEW		5. A	
2. ROVE		6. HUG	
3. COAST		7. HERON	
4. STEEL		8. NORDIC	

From what two words have each of these been derived?

160. PLENTY OF FISH

CAN you arrange the letters in the phrase below to give the names of five different kinds of fish? No letter must be used oftener than it appears here.

AN EASY PROBLEM, DASH IT, UNCLE.

161. QUICK CROSSWORD

Across :
1. Hats hang on this word.
4. Head of corn.
5. Insert a shoot.
8. Hard-water deposit.
9. Religious treatise.
12. Pleasant accompaniment of bill.
13. Flaxen part of Towser.

Down :
1. A drink.
2. Human organ.
3. Dishonest means of political advancement.
6. — and feather.
7. Region.
10. Schoolboy's exclamation.
11. Drag behind.

162.   CHOOSE EIGHT TOWNS

THE eight blanks in the following passages are to be filled up with the names of towns in England and Wales which will punningly complete the sense.

1. Whist came first and then . . .
2. He: I'll send the coal dealer a . . . I remember. Did you say half a ton ?
She: No, . . .
3. A : What is the sign of the goodness of a pudding ?
B : When it's all . . .
A : And badness ?
B : When there's . . .
4. East : I saw you running about in a nice little . . . the other day.
West: Yes, I'm thinking of putting a . . . through for a new one. What make would you recommend me to have ?
East: . . .

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The names required will be found among the following:
Watford, Stoke, Tenby, Deal, Leeds, Redcar, Cardiff,
Eton, Cowes, Cambridge, Haverfordwest, Bath, Darlington, Runcorn, Nuneaton, Ryde, Morecambe.

163. GATE-CRASHERS

IN each of these sets, there are two names of characters
from a book or a play, and a third which does not
belong to the same book or play. Single out the intruder.

1. MAD HATTER, MARCH HARE, RIKKI-TIKKI-TAVI.
2. CUTTLE, HOOK, WENDY.
3. APOLLYON, MR. BADMAN, GIANT DESPAIR.
4. GLUMDALCLITCH, GARGANTUA, GULLIVER.
5. SIR PETER TEAZLE, BOB ACRES, MRS. MALAPROP.
6. ANN VERONICA, ANN PARNICK, KIPPS.
7. GUY MANNERING, CAPTAIN MACHEATH, DANDIE DINMONT.
8. TOAD, BEAVER, WEE WILLIE WINKIE.
9. AMELIA SEDLEY, MRS. BARDELL, BECKY SHARP.
10. OBERON, BOTTOM, BARDOLPH.
11. FIBBY WINKS, STALKY, M'TURK.
12. POLLY PEACHUM, FAGIN, THE ARTFUL DODGER.

164. PICK A POSY

FROM each of these place-names take the letters of a
word and leave the letters in a flower :

ALDERSHOT, SOMERSET, PENKRIDGE,
DROITWICH, LINDISFARNE.

75

165. GEOGRAPHY WITHOUT TEARS

NAME the twenty-six places on this map. To make your task easier, they have been chosen in pairs. The two places making a pair differ by only one letter. So, if you spot Leeds, you may soon find Lewes.

166. SIX BEASTS

TAKE a letter from each line in order from 1 downwards, thus forming the 5-letter name of an animal. Then reverse the process, beginning with 5, and continuing with 4, 3, 2, 1, to form a second beast-name of 5 letters. And so on, down and up alternatively, till you have found six such names. No individual letter is to be used twice over; this, of course, means that all 30 letters are used.

1.	M	A	R	T	H	E
2.	S	A	D	Y	O	U
3.	P	R	O	M	E	N
4.	O	A	S	I	N	E
5.	R	A	L	P	H	E

167. TO A "T"

CUT out four pieces of paper or cardboard to the shape and size of those in the diagram, and fit the pieces together to form a capital T.
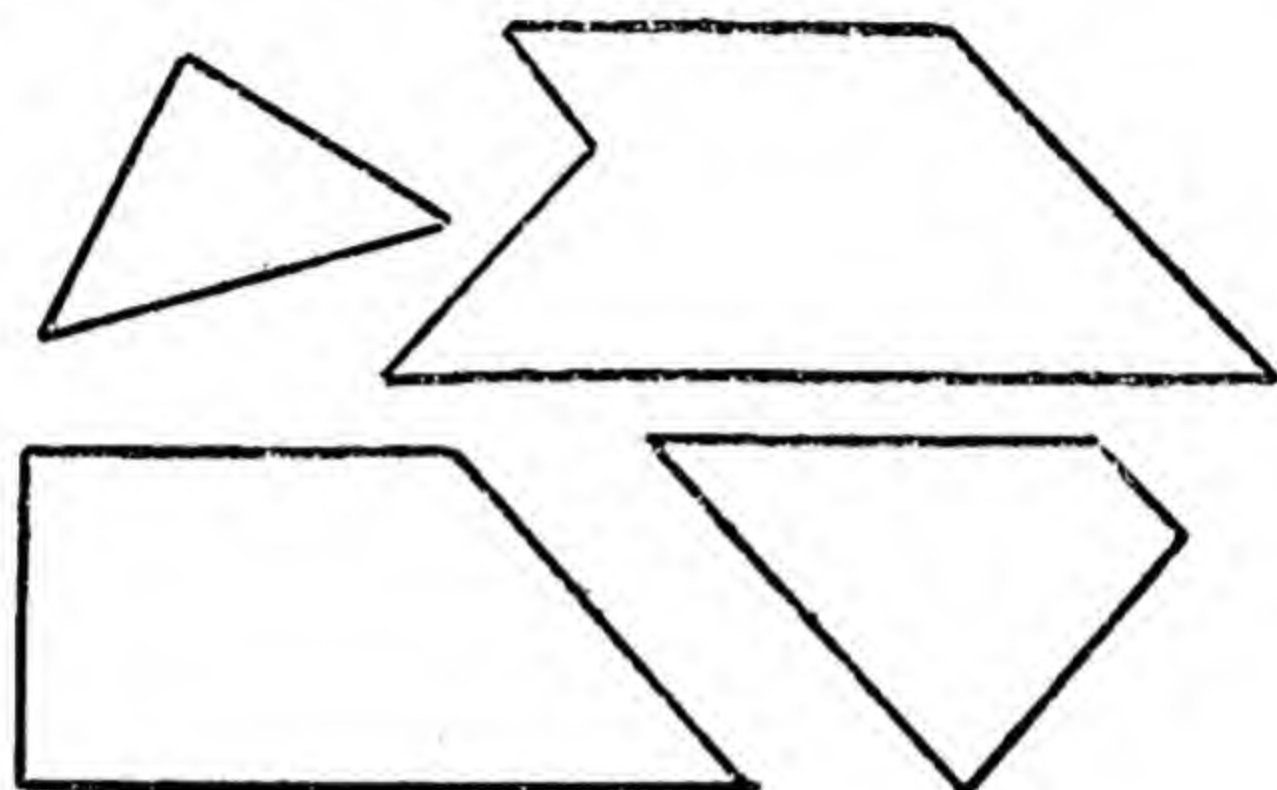
168. WORD SQUARE IN FRAGMENTS

HERE are seven three-letter words and seven of four letters :

ART, ERE, ERR, NET, RAN, NAG, SET.

GONG, LENS, LENT, REST, SENT, TARN, TRIO.

Pair them off—a three with a four—to form seven sets of seven letters, each set when rearranged forming a word. The resulting seven words, if correct, can be used to form a word square.

169. CRYPTIC QUOTATION

CAN you get the first line of a well-known song from the cipher below ?

Let Scotland Yard guide your discard,
And waltz-time show you how to go.
ABRAMJEDDOGKISSEMQKGARCDAZUTPASD
ULLJAZZUSA.

170. CANS AND TINS

THE average Briton gets his sardines or peaches from a "tin"; our U.S.A. friends favour the word "can."

Here is a problem covering both schools of thought—to discover the two seven-word sets indicated below, the missing letters being replaced by dots.

```
C A N . . . . . .        (fruit)
. C A N . . . . .        (piece)
. . C A N . . . .        (containers)
. . . C A N . . .        (adventurer)
. . . . C A N . .        (poisons)
. . . . . C A N .        (wind)
. . . . . . C A N        (friar)

T I N . . . . . .        (tinges)
. T I N . . . . .        (on the move)
. . T I N . . . .        (material)
. . . T I N . . .        (temperate)
. . . . T I N . .        (early)
. . . . . T I N .        (rake)
. . . . . . T I N        (film dog)
```

171. TOWNS AND CITIES

To each word add a single letter, rearrange, and form the name of a town or city in Europe. The letters added form, in their right order, the name of still another city.

1. STABLE
2. BRINE
3. TROOP
4. ROUT
5. GARBLED
6. HATES
7. WERE
8. PLANS

172. RINGING THE CHANGES

OF the seven words required, two are here already. Each of the five to be entered in the blank spaces is

formed from its predecessor by changing one letter and rearranging, Nos. 1, 3, 5, 7, you will observe, all consist of the same letters.

1.	RELATING
Change R into E and form	
2.	
Change E back into R and form	
3.	
Change G into M and form	
4.	
Change M back into G and form	
5.	
Change T into N and form	
6.	
Change N back into T and form	
7.	TRIANGLE

173. ANAGRAMMATIC

THE following paragraph contains, in anagrammatic form, the name of a famous author and the titles of eight of his works. The anagrams are contained in three or more complete consecutive words.

Gone, lad, any vain idea that the novelist's job is a soft one. Such a statement in most cases is all a matter of banter. He's got opinions to air, can air them in the form of fiction, and, given a new idea, he is up, quivering, busier than ever—in a trice on top of his form. He makes careful notes before his thoughts alter and is sure thus not to forget any fresh inspiration. Is not a written note wiser for him than a mental one ? Having thus prepared his chart, able work is more likely to be accomplished. Conscientious work bores no true novelists.

174. NUMERICAL QUATRAIN

A PHRASE of two words consisting of ten different letters, numbered 1, 2, 3, ... 0, supplies the key to this rhymed quatrain.

8326 75606 8486 29 13578 23 3268,
923 60546, 923 759 51388;
6229 02 154 51986 8326 1286,
60359183. 02 729605974.

DOUBLE ACROSTICS

175. Up and down and to and fro,
That is how the rhythms go.
1. Models change, but it is queer
That they rarely now appear.
2. This painter's name—of foreign nation—
Suggests a cheery salutation.
3. I twice make a word
As the name of a bird.
4. Provisionally speaking is
Of service to the Services.
5. Abroad it's very strong in favour,
And stronger still perhaps in flavour.

176. He knows all about inflexions,
Latin verbs and conic sections.
1. The symbol that is added makes a shot
Which bothers even scratch men quite a lot.
2. Full of glamour and of guile
Was the serpent of old Nile.
3. A gap you enter
At the centre.
4. The total our labour produces changed round
Will mean that we're rather annoyed, it is found.

5. Talk that's far less dignified
   When a different head's supplied.
6. Soapy particles
   Contain two articles.

177. COMMERCE pursues a devious course ?
     No, that's not what I meant to say ;
     Yet uprights influenced, perforce,
     The commerce of a bygone day.

   1. Poets may thus opinion state.
   2. Helps the Punjab to irrigate.
   3. A person too these isles will name.
   4. Satiric poem known to fame.
   5. Here, though a vice you may suspect,
      You must admit there's no defect.

178. CAPACIOUS vessel here we see,
     Integral in its form may be.
   1. One of royal sisters three.
   2. Lacking nation, fancy free.
   3. Puts an end to hymnody.
   4. Legal immaturity.
   5. Ingredient (so to speak) of glee.

179. A CLOSING period may be held to show
     Some regularity of ebb and flow.
   1. Turn to advantage deed of derring-do.
   2. Pudding or soup—there needs no further clue.
   3. Change for the better to include mankind.
   4. Now here on earth perfection we may find.

180. RIDERS of darkness—when anyone has 'em
     You may judge there's a sign indicating "to chasm."
  1. Here what you lack
     Comes from a quack.
  2. A term that's often used in sport
     For the upper ten of the thinking sort.
  3. Though we might call his occupation
     Provisional, he serves the nation.
  4. Where you may dwell in cell or lonely grot,
     The world forgetting, by the world forgot.
  5. And now, my friend,
     You've reached the end.

181. LUXURIOUS fare, one thought, would mar,
     Not make, as here, a Movie Star.
  1. The man who draws will in his turn
     Show what every man may earn.
  2. Give it an opening, and
     Water will flow on the land.
  3. With stress ?
     Oh yes !
  4. Great help indeed
     When needing speed.

182. ALTHOUGH the diner may have either,
     It's that, if this, that you'll get neither.
  1. Turn an optic on this,
     And the theme you won't miss.
  2. Icy greeting
     Here you're meeting.
  3. You've read how the Abbot of Aberbrothok
     Placed a warning bell on this perilous rock.
  4. By it the truth may be served on a plate,
     And in it the judges may settle your fate.
  5. The man in goal—how came the same
     To find himself in charge of the game ?

183. THAT "Naughty Nineties" misbehave
 Although they've one foot in the grave,
 Seems strange; and why the middle-aged
 Should make loud noises when enraged
 May puzzle those who have eschewed
 Acquaintance with such latitude.
 1. Term to inferior folk applied.
 2. Music and words are here allied.
 3. The blow's recorded, so to say,
 Ere a moment goes astray.
 4. Thus we may act, or this may find
 When blows are really too unkind.
 5. Supply what's wanting here, and you
 Will see what lack of it may do.
 6. Sounds out of place in sacred fane.
 7. May tell you when it's going to rain.

184. READING, or somewhere far away,
 Incited to a roundelay.
 1. Lived here long in the past
 (Too long, perhaps, to last !)
 2. Making it very clear
 We want no Tory here.
 3. Three constitute the crew;
 Two with one, one with two.
 4. To get things clear once more—
 Bare feet on Wigan floor.

TRIPLE ACROSTIC
185.   These
             Trees.
 1. Wide.
             Guide.
 2. Runs out, to make
             More than one lake.
 3. Sickly, sloppy,
             Somewhat soppy.

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QUIZ

186. Complete these titles:—

1. Stalky and ——
2. Man and ——
3. Rewards and ——
4. Sorrell and ——
5. Love and ——
6. Tommy and ——
7. Sohrab and ——
8. 1066 and ——

187. WHAT number between 40 and 50 can be divided into 4 parts so that if you multiply the first by 2, add 2 to the second, subtract 2 from the third, and divide the fourth by 2, the answer in each case will be the same?

188. Who said?—

1. What shall we do with this bauble? Here, take it away.

2. I wish he would bite some of my other generals.

3. I know that I have but the body of a weak and feeble woman; but I have the heart of a king, and of a king of England too.

4. Roll up that map: it will not be wanted these ten years.

5. I called the New World into existence to redress the balance of the Old.

189. WHEN Probate died, it was found that he had left his money to his grandchildren, to be shared as follows: the eldest to have £1,000 and one-eighth of the remainder; the next, £2,000 and one-eighth of the remainder; the third, £3,000 and one-eighth of the remainder; and so on. As it happened, each received

the same amount. How many grandchildren were there, and what amount of money did Probate leave?

190. SOME of these belong to the animal kingdom, some are minerals, some belong to neither class. Which are (a) mineral, (b) animal?

Termite, Dolomite, Lazulite, Buchmanite, Bakelite, Tishbite, Stylite, Aerolite, Bauxite, Aconite, Ebonite.

191. THERE are two roads from Netherham to Snugby, one consisting of equal distances up- and down-hill, and the other, skirting the hill, along the level. If my pace up-hill averages 2 miles an hour, and down-hill 3 miles an hour, I take the same time using the hill road as I do along the level route at 3½ miles an hour.

If the level road is 5½ miles longer than the hilly one, how long is it?

192. WHAT particular powers or characteristics belonged to these?—

1. Houdini.
2. Stentor.
3. Captain Webb.
4. Galahad.
5. Orpheus.
6. Nestor.
7. Cinquevalli.
8. Proteus.
9. Blondin.
10. Atalanta.

193.

```
  L E M O N S          L E M O N S
      L E S S                M O R E
  ─────────────          ─────────────
  L P P E P I          L E E E M A
  ─────────────          ─────────────
```

A ten-letter word (numbered 0 to 9) provides the key to the larder.

194. "Soon after the steamboat had got under weigh, a cabin-boy was accused of cutting his initials on a table. His alibi to this inditement was that he did not possess a knife."

Point out any errors in this narrative.

195. A man's gross income of £ABC is reduced to £CFE by payment of taxes amounting to £DDE; after he has paid £GC rent, the £BGB remaining, covers his further expenditure of £DEF, and leaves him with a balance of £HB for savings. For what 8 different figures do the letters A to H stand?

196. Two of these are perfumes, two narcotics, two fermented liquors, two food-dishes. Which?

Lotus, attar, lobscouse, koumiss, bhang, civet, saké, salmagundi.

197. If three white counters and four black counters are put in a bag and drawn out one at a time, the counters being placed in a row, what are the odds against there being a white counter at each end of the row?

198.

Which of the two lines, A and B, is continued on the lower side of the diagram?
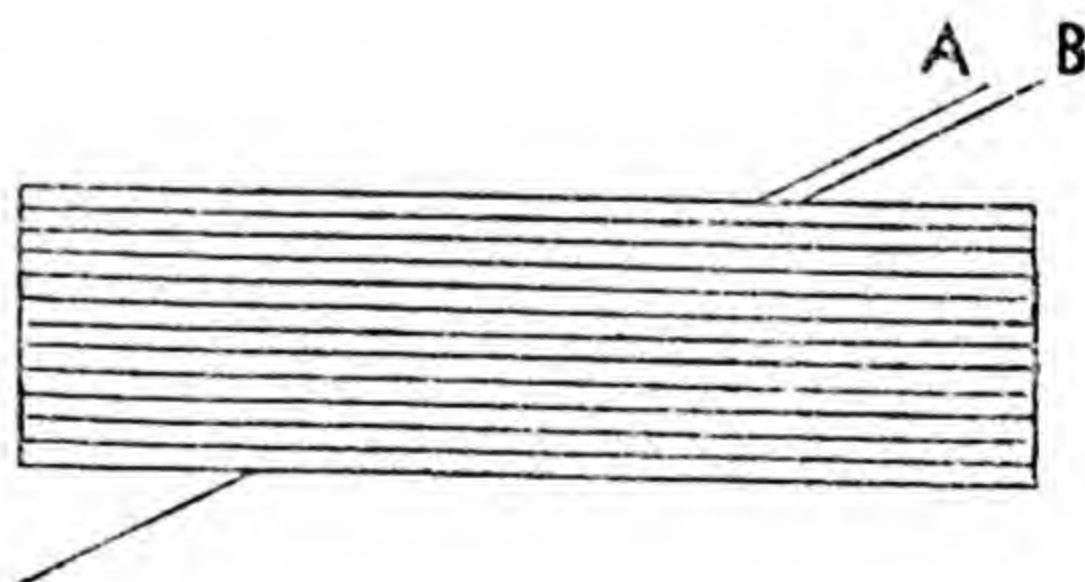
199. Two schoolmasters, working on a farm during a vacation, wished to establish the weight of some potatoes they had dug. They put a plank on a fence, and

balanced each other on the plank. Then they changed places, but this time the lighter man (10 st. 10 lb.) held the bag of potatoes. When they discovered that in these changed positions the lighter man—and the potatoes—balanced the heavier man (12 st. 12 lb.), they were able to find the weight of the potatoes. What was it ?

200. INSERT one letter 13 times to make sense of this.
HEHATOAETHEAETOFHIITERETATE

201. A PATROL had to fight three engagements. In the first they lost half a man more than half their number; in the second, a third of a man more than a third of their remaining number; in the third, a quarter of a man more than a quarter of the number that remained. They regained their lines 20 men strong. How many men did they lose in their three fights ?

202. WHAT word contains sul, in the beginning and the end ?

203.

PLACE the digits 1 to 9 in the small circles, in such a way that the three digits in every straight line add up to 15.
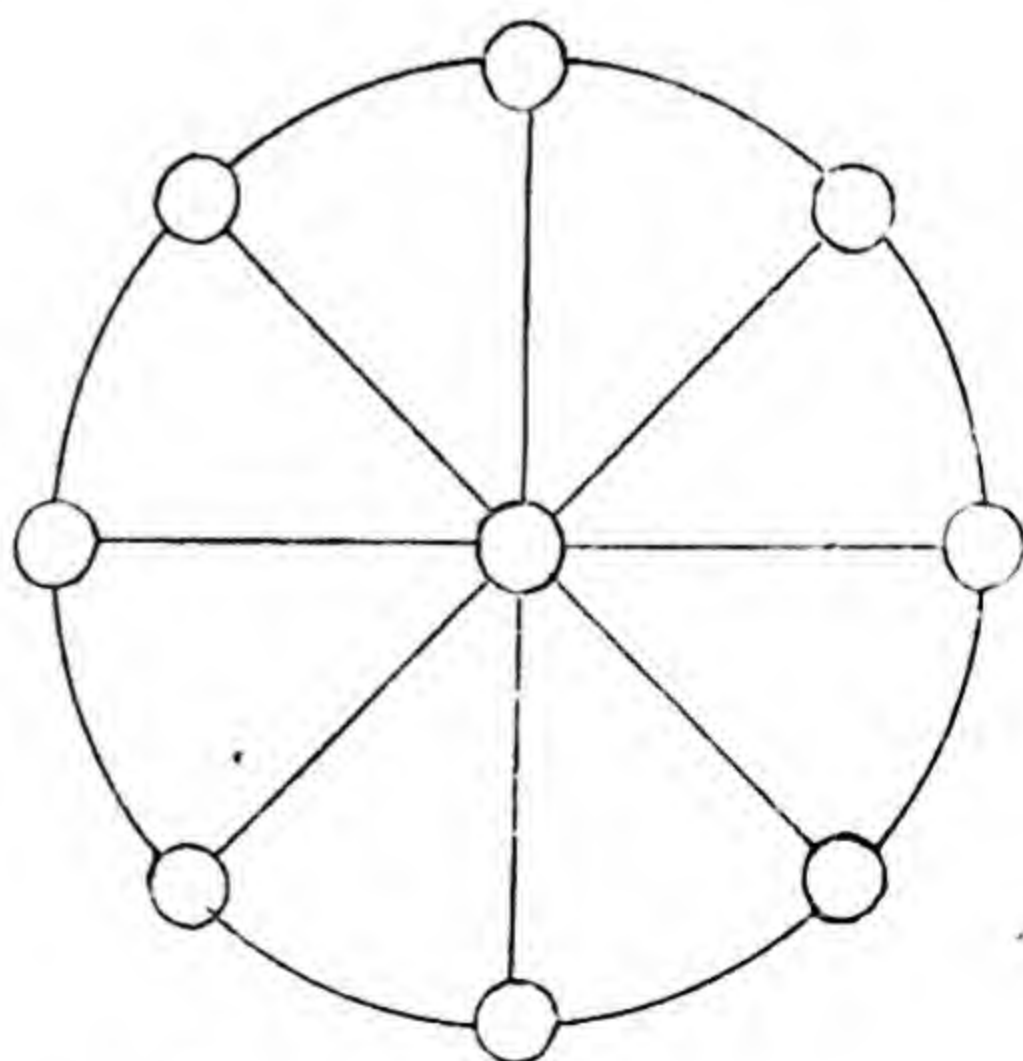
204. WHO stole ?—
    1. a pig—and ran away.
    2. a cardinal's ring.
    3. Helen of Troy.
    4. some tarts.
    5. Shylock's ducats.
    6. fire from Olympus.

205. DIGMAN bought a shillingsworth of small plants. If he had had 2 more for the money, the price would have been a penny a dozen cheaper. How many did he get ?

206. COMPLETE the following words by filling up the gaps with words of the length indicated by the dots. The words added form a salutation.

Whinc....
C...ee
Ex..rt
Mo...r
C...t

207. MY present age is equal to the difference between four times my age four years hence and four times my age four years ago. How old am I ?

208. How many wheels has each of these vehicles ? Whisky, barouche, sulky, velocipede, palanquin.

209. A MAN drove his car up a gentle slope of half a mile at 30 miles an hour. How fast would he have to drive his car down a corresponding half-mile slope on the other side to average 60 miles an hour for the whole distance ?

210. IN each of these groups of four, there is one which differs in some clearly defined way from the other three. Can you spot the "incompatible" one?

1. Negus, tiffin, stingo, sack.
2. Hoopoe, ortolan, marten, laughing jackass.
3. Lancasters, Sunderlands, Halifaxes, Wellingtons.
4. The Gondoliers, Patience, Merrie England, Ruddigore.
5. Guitar, lyre, oboe, harp.
6. Pegasus, Bucephalus, Discobolus, Rosinante.
7. Wherry, curricle, shallop, felucca.
8. Brobdingnagian, Cyclops, Liliputian, Gargantua.
9. 12, 23, 34, 45.
10. Ezekiel, Hezekiah, Nahum, Obadiah.

211. JONES was a great believer in his luck, and could seldom resist any form of gamble. One day he decided to gamble on the toss of a coin. Starting with £1, he betted half that amount on the first toss. Six times in all he did this—each time betting half the money he had then.

Jones won three times, and lost three times.

Did he win or lose in the end—and how much?

212. WHAT was the colour of?—
Stacpoole's Lagoon
Stevenson's Arrow
Hawthorne's Letter
Dumas' Tulip
Conan Doyle's Company
Kenneth Grahame's Age.

213. AFTER a party of men had had a meal together, two of them discovered that they had no money. So the others settled the bill of 30s., each paying 9d. more than his rightful share.

How many men were there?

214. CAN you interpret this ?—

DOWHENUBT, DIFFESOMERENT CLINPLAYERSE DULGTOE BRECKLESSLYIDS DICWHICHATE COMPSHEERETENCE.

215. IN each sentence there are two missing words. The number of letters in the first is indicated by digits; the second word contains all the letters in the first, in the same order, and some others, each of which is represented by 0. Thus "Next you 123 the red ball with the 01230" would stand for *hit* and *white*.

1. It was strange to hear a charge of 12345 brought against a 012345.

2. She 1234 him for his expensive habit of wearing an 001234 daily.

3. In his great 1234 poem, he 01234000 the struggle of two noble races.

4. Your punctuation is bad: you need a 12345 after "1234500."

5. In choosing a profession, he finally yielded to the 1234 of a career in 0123400.

6. The actress 12345 and ranted throughout, and failed to preserve the dignity of this fine 0123450.

216. ON my way to the station, I passed the post office at 8-30, having gone a quarter of the distance from home. At a third of the distance, I passed the Town Hall clock, which said 8-35.

When did I get to the station ?

217. CAN you bag eleven birds by doing the round of these squares ? You visit every square once—and once only. You move to any adjacent square, N., S., E., or W., but not diagonally.

The last letter in the name of any bird is to be taken

as the first in the next. It does not matter, therefore, where you begin, as this is an "endless" chain and you finish with the letter with which you began.

R	G	S	U	R	H	T
E	E	H	O	E	T	I
T	O	P	O	N	N	I
E	A	I	B	W	A	L
A	L	W	I	E	G	I
R	K	I	S	M	T	A

218. ALFRED has what Bertram has and a third of what Colin has; Bertram has what Colin has and a third of what Alfred has; Colin has £10 and a third of what Bertram has.

How much money has each?

219. WHICH of the Christian names in the first list are linked with the surnames in the second list as the names of well-known people :—

William, George, Bysshe, Matthew, Samuel, Ewart, Percy, James, Ben, Alva, Horatio, Herbert, Washington, Thomas, Theodore, Joseph.

Wells, Nelson, Gladstone, Pepys, Jonson, Lister, Shelley, Roosevelt, Barrie, Irving, Edison.

220. In a hundred yards' race, Lightfoot, giving A. L. Soran a start of half a yard beats him by one-fifth of a second; but Soran, receiving a start of $4\frac{1}{2}$ yards, beats Lightfoot by one-fifth of a second.

What is Lightfoot's time for the 100 yards?

221. It was a roundabout route that a whimsical fellow took from Hull to Kendal, for he made up his mind that the name of each town he visited must begin with the two letters which ended the previous one! This is what his route looked like. Can you name (in thirty seconds) the seven towns he passed through?

222. "I'm a very poor player," said Brown, "you'll have to give me a start. Robinson always gives me 40 in a 100."

"Well," said Jones, "I play pretty level with Robinson when I give him 20 in a 100."

"Then if you give me 60 in a 100," said Brown, "that will be about right."

Was it?

223.
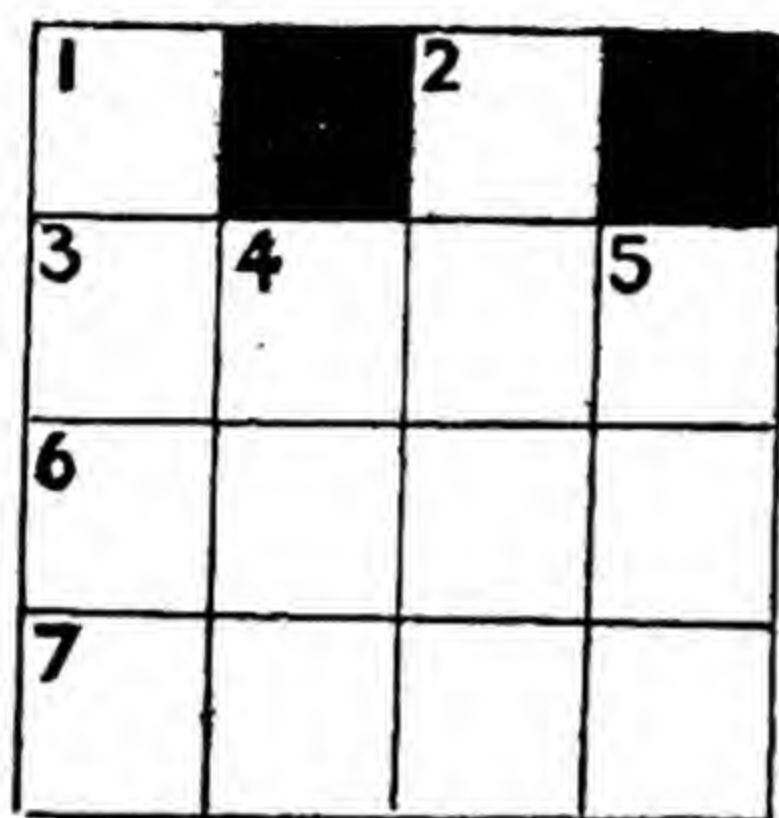
1		2	
3	4		5
6			
7			

Across	Down
3. anag. of 6 *across*	1. small object.
6. anag. of 7 *across*.	2. demi or hemi.
7. anag. of 1 *down*.	4. 6 *across*'s dial.
	5. encountered.

224. ARRANGE ten pennies on a table so that they form five rows with four pennies in each row.

225. WHAT are the proverbs whose meaning is expressed by the following ?—

1. An attractive appearance is not always a reliable indication of worth.

2. The accumulation of wealth is not advanced by frequent changes in the means employed in its pursuit.

3. It is rare for ill-fortune to continue with un-interrupted persistence.

4. There are limits to the endurance of the most poor-spirited individual.

226. INSERT three letters in the spaces provided to make seven-letter words across.

The three letters themselves also form a word, in each case, and when these words are read downwards, a sentence appears.

What is the sentence?

R	A				R	S
A	P				I	A
D	E				E	D
B	I				R	Y
U	S				E	D
R	E				A	L
M	A				M	A

227. CAN you interpret this?—

FORSIFROMDEMATION FEWER ABERDETH-ATEN HABITATHENTS TEARENT CRONEASING COMETHEIRS.

228. SOME letters serve for Roman Numerals (V, X, L, etc.). The totals of the values of such letters in the words across are entered on the right-hand side. (Thus, if LEVEL were one of the words, the total entered would be 50 (L) + 5 (V) + 50 (L) = 105. As a further

guide the totals in the columns are also entered. All the words spring to the mind at Christmas time.

										10
										600
										100
										0
										1001
										101
										2001
100	0	560	1150	1	1001	1	1000	0		

229. NAME—

1. The longest word with one vowel only.

2. Two words in which the five vowels (a, e, i, o, u) appear once each, and in alphabetical order.

3. The longest single-word palindrome (word that reads the same backwards as forwards).

4. A word of five letters with one consonant only.

5. A word of thirteen letters in which one letter appears six times, and another four times.

6. A word of nine letters which contains the first six letters of the alphabet.

7. A place-name in Europe of four letters appearing twice each—and no others.

(All the words are in common use in English.)

230. Read aloud the following unpunctuated sentences without previous preparation. The reading should be in the presence of an audience and should be completed within two minutes.

Shame at her own folly made her shy a boot hitting the singer spoilt the rendering of the song until the enemy's retreat was cut off the breast stroke was used by the boy who swam the river wear nothing but your bowler hat football boots and spats were left in the room where the devil is it should I say be against your principles to linger in the monkey house you can hear the monkeys singing pack up your troubles the soldiers trudged along my aunt from America arrived to-day only wrapt in contemplation the nurse did not hear the baby crying you can pay by instalments said the man at the door of our parish church our vicar is very proud to take my wife to the theatre is a pleasure I don't like walking in the dark criminals sometimes make good sausage meat is used for stuffing elephants never forget to read the newspapers daily is useful to learn the truth about yourself you have only to ask a policeman who took bribes was dismissed the force of habit is behind most of our actions to keep our eyes in good condition we should bathe them with boiling water quickly evaporates.

•

SOLUTIONS

1. EVERY LITTLE HELPS

THE amount received was 208860 pence, which with the missing penny would be 208861. This number is the product of two primes, 631 and 331, one of which must be the number of members, and the other the number of pence sent by each (bar one !). But 630 pence is too large for the subscription.

∴ 631 is the number of members.

∴ number of pennies sent for the fund = 630.

i.e., the P.P.A.S.F. benefited to the extent of £2 12s. 6d.

2. A MIXED BAG

A, Spaniard; B. Rumanian; C, German; D, Italian; E, Hungarian.

3. MR. BRISTLING SEES THROUGH IT

THE sides of the two square parts are respectively 5 in. and 3 in. The cuts are indicated by dotted lines, and the shaded areas show how they are placed to make a 7-in. square.

These measurements are the only ones possible, subject to the restriction that the outside measurement of the figure must not exceed 10 in.
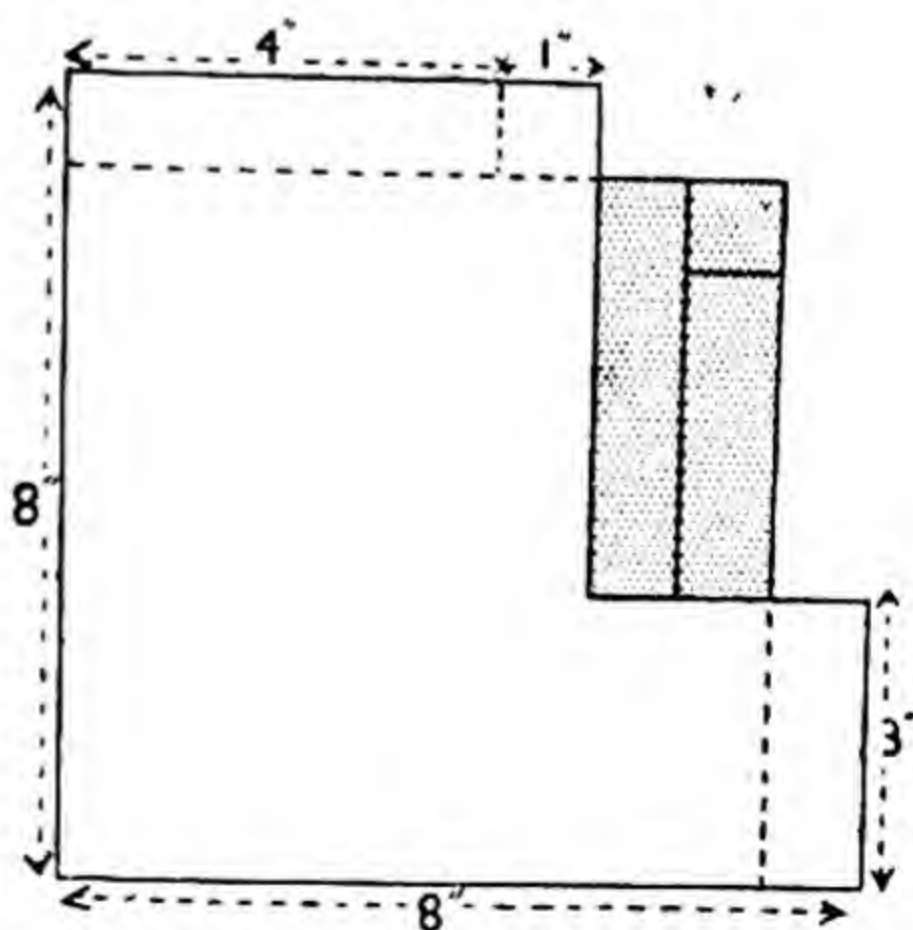
4. FLUTTERBY'S GRANDFATHER

$131 - 105 = 26$. Therefore there was a gap of 26 years between the grandfather's death and Flutterby's birth. ∴ Flutterby was born in 1898.

5. YOUNG SAVERS

LET x, y, z be the numbers bought by the Trotwood, Bailey and Bowling girls respectively. The brothers therefore bought $2x$, $4y$, $5z$. Hence—

$$3x + 5y + 6z = 44.$$

The values 0 and 1 being ruled out by the wording of the narrative, the only integral solution that fits the case is—

$$x = 2, \ y = 4, \ z = 3,$$

which tells us that the girls' names were Muriel Trotwood, Bridget Bailey and Sonia Bowling.

6. PARTIALLY MECHANIZED INFANTRY

88 miles. S to G, 72 miles, took 3 hours (Ivan walking the remaining 16 miles in $5\frac{1}{3}$ hours). Back from G to meet Anton took $2\frac{1}{3}$ hours (meeting-place 16 miles from S). Final stage, 72 miles (Leon and Anton), took 3 hours.

7. NIGHT FORMATION

THE operative word is "must." There *must* have been five men in the tent, though there *may* have been six, or seven.

8. A MINIATURE NUMBER PUZZLE

8	5	4
7	2	9
3	1	6

THE only multiple of 79 which (*a*) is a possible ending to a square, (*b*) involves no repetition of a digit, is 316, which is therefore (3). This means that the last digit of (1) is 4 (6 may not occur again).

∴ (2), a square, cannot end in 4, nor in 1 or 6. The squares ending in 5, namely 225, 625, involve repetition of a digit, as also does the ending 0. Therefore the last digit of (2) is 9. 169 involves repetition, as also does 629; 289 prefixed to 316 is not a square; ∴ (2) is 729; and the solution is completed by finding the square root of 729316, which is 854.

9. THE COLLEGE OF ETCETERAS

FROM the given places and marks it is fairly easy to determine the position of the candidates in the respective subjects. We find Whiddon 5th with 8 marks in Numismatics; so the markings for the rest, to add up to 50, must be 9, 10, 11, 12. In Astrology the marks can only be 21, 20, 4, 3, 2. And so, step by step, we reach the final result :—

Stewer, Cobleigh Medallist, with 56 marks, Whiddon 54, Gurney, 53, Davy 51, Brewer 36.

10. ESPIONAGE

Christchurch. The odds in its favour are 12 to 11—a very near thing !

The chance that the particular pair of adjacent letters, CH, should be the only survivors, is, for Chard, $\frac{1}{4}$, for there are 4 adjacent pairs possible, and only one CH. The chance for Christchurch is, similarly, $\frac{3}{11}$.

And $\frac{1}{4} : \frac{3}{11} = 11 : 12$.

11. ANNO DOMINI

Doubleday senior died in 1932, aged 69. His son was then 27, and the father's birthyear was 1863 ($=69 \times 27$).

If D sen. died in year x, aged y years, son was then y—42.

$\therefore y(y-42)=x-y$, or $y^2-41y-x=0$. Whence

$$y=\tfrac{1}{2}(41+\sqrt{41^2+4x})$$

$\therefore 41^2+4x$ is a square, x lying between 1918 and 1942.
Let $x=1918+k$ (k lying between 0 and 24)
Then $41^2+4\times1918+4k(=9353+4k)$ is a square.
But the only square between 9353 (when $k=0$) and
9449 (when $k=24$) is 9409, or 97^2, when $k=14$,

$$\therefore x=1932 \text{ and } y=\frac{41+97}{2}=69.$$

12. TIME, PLEASE

IF the time is x hrs. y mins., we have

$$5x+\frac{y}{12}+4=y$$
$$11y-60x=48$$

$\therefore y$ is a multiple of 12. The only one giving a possible
integral value for x is 48, when $x=8$.

$\therefore$ time required $=$ 8hrs. 48 mins.

13. CIPHER DIVISION

A B C D is 6543, and
P Q R S T is 98271.

14. C NOUGHTS, 5 CROSSES
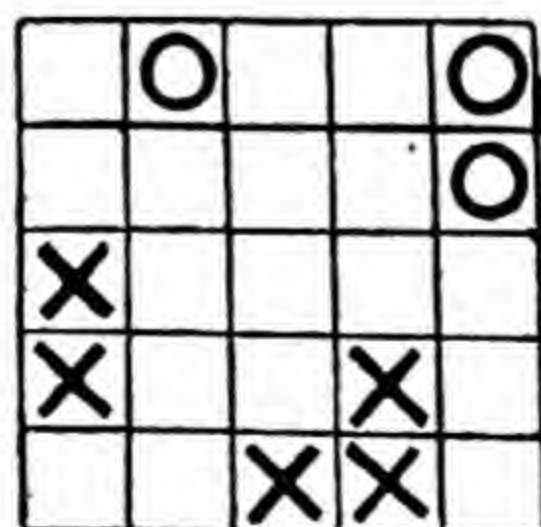
15. A BROWN MARKET

IF there were x chocolates and n children, each one taken cost Mr. R. $n-4$ pence. So $x(n-4)=3\times43$. Now there were not fewer than 6 children, and so $n-4$ cannot be 1. $\therefore n-4=3$, and there were 7 children and 43 chocolates. The only possible distribution is 3, 4, 5, 6, 7, 8, 10, the sums received being respectively 31, 27, 23, 19, 15, 11, 3 pence. This indicates Joyce as the taker of 4; and therefore Cuthbert had 7.

16. LIVE STOCK

EIGHT cows (and 14 sheep, 10 ducks).

For $5s+3d=100$. And since $s > d$, the only solutions of this are—

$$\left.\begin{array}{l} s=17 \\ d=5 \end{array}\right\} \text{ and } \left\{\begin{array}{l} s=14 \\ d=10 \end{array}\right.$$

and as $s+d=3c$, the former solution is excluded.

17. VOCATIONS AND AVOCATIONS

THE detailed steps of the solution are too lengthy for publication. But the following facts can be established :-

Adams, farmer, engaged to Kathleen, lives at Tonbridge, plays hockey.

Bunbury, lawyer, engaged to Margaret, lives at Oakham, plays cricket.

Colman, curate, engaged to Laura, lives at Ipswich, plays golf.

Denham, schoolmaster, engaged to Nora, lives at Winchester, plays billiards.

18. PROGRESSIVE PAYMENTS

LET there be n children of ages (last year) $a, b, c\ldots$

Then we have—
$$(a+1)^2+(b+1)^2+(c+1)^2+ \cdots$$
$$-(a^2+b^2+c^2+ \cdots) = 47$$
$$\therefore 2(a+b+c+ \cdots)+n = 47 \quad \therefore n \text{ is odd.}$$

If $n = 5$, $a+b+c+d+e = 21$, which is impossible.
$\therefore n = 3$, and $a+b+c = 22$.

Now, even supposing the youngest to have been as young as 3 last year, the only possible combination of ages totalling 22, which gives a sum of squares whose figures add up to 13, is 6, 7, 9. And $36+49+81 = 166$.

$\therefore$ last year's payment was £166, and this year's, £213.

19. IN THE COPPER RING

LET A, B, C be the digits of one man's stake in pence. Then $(100 A + 10 B + C)x = 240 A + 12 B + C$ i.e., $(100x - 240)A + (10x - 12)B + C(x - 1) = 0$.

If $x = 1$ we get sum of two negative terms $= 0$, which is impossible.

If $x > 2$, all three terms are positive, which also is impossible.

$\therefore x = 2$, giving
$$8 B + C = 40A$$
$\therefore C = 0$ or 8

If $C = 0$, $5A = B$ $\therefore A = 1$, $B = 5$
If $C = 8$, $B + 1 = 5A$ $\therefore A = 1$, $B = 4$
$\qquad\qquad\qquad$ or $A = 2$, $B = 9$

	I	II	III
£	2	1	1
s.	9	4	5
d.	8	8	0

The Arithmetical Progression is obviously 2, 5, 8, identifying column I with Punt. $\therefore$ Starting-price was 2 to 1, and Punt won £2 9s. 8d.

20. PUDDING PUZZLE

JOHN will eat all three, William will eat all three, Mary won't eat any !

21. HAIR APPARENT

LET age of accession $= 30+n$; then, since hairs on accession + hairs lost = hairs at 30 + new growth,

$$30+n+\tfrac{1}{6}n(n+1)(2n+1) = 17568+2n$$
$$2n^3+3n^2-5n = 6 \times 17538$$
$$n(n-1)(2n+5) = 37 \times 36 \times 79$$

where the solution $n = 37$ is easily seen.

That is, age of accession $= 67$.

22. ROUTES

(a) 67, (b) 16, (c) 35.

23. THREE DIGITS

$$954 - 459 = 495$$

24. MUCH MISSINGHAM

THERE must have been 6 in each team, for with 3 (sharing £10) 5 different partitions would be impossible, while with 4 (sharing £15) more than 5 partitions are possible, as also with 5 (sharing £20), and no number greater than 6 yields possible arrangements. They had therefore £25 to share.

Of possible arrangements (sharing £25), the following fulfils the conditions.

9 6 4 3 2

∴ Shuter received £9.

25. HOSPITALITY

FOUR. Mr. Turkey (Wenceslas) and his wife (and cousin) Holly (whose sister was Maria Mistletoe). Julia, their daughter, was Mrs. Snapdragon.

26. FELINE INTELLIGENCE

1	2	3	4	5	6	7	8	9	.
E	O	S	T	A	R	M	C	U	

27. ROUND THE TABLE

28. WIRE

IF the respective prices per yard $= a, b, c, d$ pence, we have $22287a + 29393b + 25415c + 22724d. = 775804$:

[Mod. 13] $11a \equiv 3$

$a \equiv 11$

$\therefore a = 11, 24, 37 \ldots$

[Mod. 23] $11b \equiv 7$

$b \equiv 9$

$\therefore b = 9, 32, 55 \ldots$

[Mod. 19] $4c \equiv 5$

$c \equiv 6$

$\therefore c = 6, 25, 44 \ldots$

[Mod. 17] $4d \equiv 3$

$d \equiv 5$

$\therefore d = 5, 22, 39 \ldots$

and the smallest value in each case is the only possible one.

The respective prices per yard of the different qualities of wire are 11d., 9d., 6d., and 5d.

· 29. DRINKS ALL ROUND

THERE were 7 in one front room and 3 in the other. There were 6 in one back room and 4 in the other.

30. SIMPKIN'S SUCCESS

LET N = number attending meeting, and a, b the digits of Simpkin's votes.

Then $10a+b-(10b+a)=9(a-b)=\dfrac{N}{25}$

Also $10a+b+3(10b+a)+10=13a+31b+10=\dfrac{N}{3}$

Whence $75a-75b=13a+31b+10$
$$31a=53b+5$$
Whence $b=4$ and $a=7$
$\therefore N=25\times9(7-4)=675.$

31. A RACE OF LIARS

GEORGE was first, Adolf second, Wat third, Bally fourth, Tommy fifth.

32. THE BRONX BROS.

CATCHO, 36; Limbo, 34; Porko, 33; Bingo, 29.

33. LINES AND PAGES
Four.

34. DIAGONALS
(a) 15.   (b) 39.   (c) 25.   (d) 111.

35. WAR SAVINGS

LET F. M. S. = number of coins collected by Father, Mother, and Son respectively.

Then $30F + 12M + S = 1200$

$F + M + S = 100$

Tabulating the positive integral solutions—

	I	II	III
F	11	22	33
M	71	42	13
S	18	36	54

From the data, I is the Brown family, II Jones, and III Smith. Also, Tommy is a Brown, and Albert a Smith : ∴ Willie's name is Jones, and he has collected 3s.

36. ABSENTEEISM

SINCE $3277 = 113 \times 29$ (both prime), there were 29 boys who worked. Therefore number of absentees = 6.

37. FIND THE NUMBER

SUM of two digits must be less than 19, and since there are four digits, the first = 1. Calling the others $a, b, c,$ we have

$$81(1+a+b+c) = 1000 + 100a + 10b + c$$

Also

$$b+c = 10 + a - 1$$

Eliminating a,

$$52b + 61c = 748$$

the only solution of which in positive digits is $b=5, c=8$.

∴ the number is 1458.

38. COUNTING THEIR CHICKENS

A, 32; B, 35; C, 56 ; D, 6; E, 24; F, 32.

39. ADDITION

THE keyword is INTRODUCES.

40. SPEEDS

A, 45 m.p.h., B, 30 m.p.h.

For, if the speeds are a, b, m.p.h., and t hours$=$time taken to reach the point at which they pass, A has then gone at, and B bt miles.

A does the remaining bt miles in 4 hrs. and B, at miles in 9 hrs.

$$\therefore bt = 4a, \quad at = 9b$$
$$\therefore b^2 = \frac{4}{9}a^2, \quad b = \frac{2}{3}a$$

And $9b+4a = 450$
$$10a = 450$$
$$a = 45 ; \text{ and } b = 30$$

41. STOCKING THE LIBRARY

History, 12, Philosophy 7, Zoology 4.

42. A PAIR OF ACES

LET $x =$ number of flights made by each before the equalizing ones took place. Then, if Gunn's most recent flight had a victims, and van Zoom's b,

$$\frac{4x}{9} + a = \frac{2x}{5} + b$$
$$2x = 45 (b - a)$$

$\therefore b - q$ is an even number, and must be 2, for any

greater number would give at least 90 for x, which is too great. And, as both pilots scored in the last flight, b is not less than 3, for a is at least 1.

$$\therefore x = 45 ; \quad \frac{4x}{9} + a \text{ is at least 21.}$$

43. PRE-WAR POTTERING

LET x m.p.h. = P's usual speed.
$\therefore$ my actual speeds $= x + 7$ and $2x - 4$
$\therefore$ my average speed $= \dfrac{2(x+7)(2x-4)}{3x+3}$ $(=43.2)$
$\therefore x^2 - 27\cdot4x - 46\cdot4 = 0$
giving the positive solution, $x = 29$.

44. SHARING THE SWEETS

HALF-SISTER !

(The partition would be impossible if all four had the same mother. But otherwise there are two possibilities. Calling the children A, B, C, D, the relationships to A may be : B, brother; C, half-brother; D, half-sister; or B, brother; C, sister ; D, half-sister.)

45. THE WAR HITS BOLONIA

(a) Only two men carried gas-masks.
(b) None.
(c) One only (female, of course) carried umbrella, bag, and gas-mask.

46. MENTAL ARITHMETIC

7½d. (Charles—6d., John—1½d.)

47. BY ROAD AND RAIL

27 miles.

Whole journey $= 252$ miles.

A to B $= 64$ miles (rail)   [remainder $= 188$]
B to C $= 48$ miles (road)   [remainder $= 140$]
C to D $= 36$ miles (road)   [remainder $= 104$]
D to E $= 27$ miles (rail)   [remainder $=\ \ 77$]
E to F $= 77$ miles (35 by rail and 42 by road).

48. SOAP

SINCE $\frac{1}{4} + \frac{1}{3}$ $(=\frac{7}{12})$ of a cake of soap remained over, $1\frac{5}{12}$ cakes were used by 3 people in 17 days. Each person therefore used one thirty-sixth of a cake per day.

After x days Harold had $1 - \frac{x}{36}$ left, of which we used $\frac{17-x}{18}$ of a cake in the remaining time.

$\therefore 1 - \frac{x}{36} - \frac{17-x}{18} = \frac{1}{4}$, giving $x = 7$.

The exchange was therefore made at the end of the first week.

49. THE OLDER THE FEWER

24. Each cracker provides "pulls" for *two* children.
  16 (under 12) pulled 32 crackers.
   8 (12 or over) pulled 12 crackers.

50. PASTURE

40 days.

51. PERSONAL POINTS

George should receive $3\frac{1}{2}$d., Ann $\frac{1}{2}$d.

52. FIND THE FIGURES

1 2 3 4 5 6 7 8 9 10
A B R I D G M E N T

53. LONG, LONG AGO

B.C. 97. (In 69 B.C. Marius was 28, Flavius 42; in 41 B.C. M. was 56, F. 70.)

54. DIVIDED INTEREST

$$126)5544(44$$
$$504$$
$$\overline{504}$$
$$504$$

55. NUMERICAL CIPHER

$P = 5$, $Q = 7$, $R = 6$ is the only solution in Arabic numerals, giving $76^2 = 5776$. But, using Roman numerals for the "undisclosed numerical symbols," we also have CXXI as the square of XI.

56. THE DISPATCH RIDER

Let C, D be the speeds, in m.p.h., of column and rider. Then rider's time in hours for whole journey =

$$\frac{17}{D-C} + \frac{17}{D+C} = \frac{34D}{D^2-C^2}$$

In this time the column goes 17 miles.

$$\therefore \frac{17}{C} = \frac{34D}{D^2-C^2}, \text{ i.e., } D^2-C^2 = 2DC$$

$$\therefore D^2-2DC+C^2 = 2C^2$$

$$D-C = \sqrt{2}C$$

$$\therefore D = (\sqrt{2}+1)C$$

$\therefore$ while column goes 17 miles, rider goes $17(\sqrt{2}+1)$ miles = 41 miles (approx.).

57. UNLIKE PAIRING

THERE are two possibilities from the original data.
(a) 17 half-crowns, 29 shillings, 51 sixpences.
(b) 22 half-crowns, 34 shillings, 51 sixpences.
The solution excluded by the age question is (b).
∴ (a) is correct, that is, the value of the coins on the table was £4 17s. 0d.

58. CROSS-NUMBER PUZZLE

HERE is one line of approach: 2 *down* must be 27^3 (= 19683), for 64^3 has six digits. If 1 *across* were 31 or any greater number, 12 *down* would have a cube of more than 5 digits. ∴ 1 *across* is 11, and 12 *down* is 23, giving for 1 *down* the number 12167. ∴ 6 *across* is 292; 11 *across* is a 5-digit cube beginning 68... ∴ it is 41^3 (= 68921) and 7 *across* is 41, and 8 *across* is 164. ∴ 9 *down* (multiple of 41) is 492, 14 *across* (multiple of 11) is 231. ∴ the end digit of 3 *across* is 1, and as 3 *down* must be 22, the middle digit of 3 *across* is 7. 4 *down* (multiple of 17) is 748, 10 *across* is 81 (factor of 2 *down*), and 5 *down*, being 11111, is the product of 271 and 41.

59. EGGS

At 11.59.

60. MR. FACTOR'S FAMILY

Two of the possible sets of three factors of 2772 add up to a square number: 33+28+3=64, and 22+21+6 =49. Since 8 is not greater by one than 3, the second set must be the one required, giving the ages 22, 21, 7, 6.

61. CARD SENSE

PLACE = 39,856

ACE =   856

_____

TO WIN = 40,712

_____

62. AT OUR BAZAAR

LET us denote the six-figure number (x^2) by the digits ABCDEF (not necessarily all different).

Then $10,000 \times AB + 100 \times CD + EF = x^2$.

Now $CD = AB + EF + 1$, ∴ $10,100 \times AB + 101 \times EF \times x^2$.

∴ $x^2 = M(101) + 100$, ∴ $x = M(101) \pm 10$, whence we can get several possible values for x which, when squared, satisfy the conditions for x^2—394, 495, 515, 596, etc.

But the only one of these satisfying Potter's final condition is 596. ∴ $x^2 = 596^2 = 355,216$.

That is, the winning numbers were 35, 52, 16.

63. UNPLEASANTRY

THE winning list was: Himmler, Quisling, Laval, Mussolini.

64. SUITS

A held a heart, B a club, C a spade, D a diamond.

65. THE SNAIL TRAIL

TIMOTHY, who had obviously overtaken Albert on March 5th (when each had gone a total distance of 25 ft.) held the lead until March 12th, when he was overtaken by Albert, who travelled 23 ft. on that day against Timothy's 20.

66. COMBS

$1386A + 1092B + 1001C + 1716D = 39742$

[Mod. 13] $8A \equiv 1$

$A \equiv 5$ $\therefore A\ (< 12) = 5$

[Mod. 11] $3B \equiv 10$

$B \equiv 7$ $\therefore B\ (< 12) = 7$

[Mod. 6] $5C \equiv 4$

$C \equiv 2$ $\therefore C = 2$ or 8

[Mod. 7] $D \equiv 3$ $\therefore D = 3$ or 10

Substituting $A=5$, $B=7$, the equation reduces to $7C+12D=176$ (If $C=2$, $12D=162$, impossible)

$\therefore C=8$, $D=10$.

Prices were A 5d., B 7d., C 8d., D 10d.

67.   RIDE AND TIE

CALLING Dan's and Bert's original speeds d and b m.p.h., B rode 5 of the first 9 mls. at $2b$ m.p.h., and D, 4; and since their times were the same

$$5/2b + 4/b = 4/2b + 5/d$$

giving $b : d = 9 : 10$. Let $b = 9u$, $d = 10u$.

For the remaining $2x + 1$ mls. B walked at $9u - \tfrac{1}{2}$, D at $10u - \tfrac{1}{2}$, and the pony's speed was $20u - 1$ m.p.h.; B rode $x + 1$ mls., D, x.

Again equating their times

$$\frac{x+1}{20u-1} + \frac{x}{9u-\tfrac{1}{2}} = \frac{x}{20u-1} + \frac{x+1}{10u-\tfrac{1}{2}}$$

Whence $x = \dfrac{18u-1}{4u}$, $x + 1 = \dfrac{22u-1}{4u}$

$\therefore$ Total time in hrs. $= \dfrac{5}{18u} + \dfrac{4}{9u} + \dfrac{22u-1}{4u(20u-1)} + \dfrac{1}{2u} = 3.$

Which reduces to $2160u^2 - 1186u + 53 = 0.$

$\therefore u = \tfrac{1}{2}$, the other solution, $u = \dfrac{53}{1080}$, having no reasonable interpretation.

$\therefore x = 4$, and total distance $= 18$ miles.

68. CARDBOARD ECONOMY

(a) 18 (2 each of A, D, E, and 1 each of the remaining 12).

(b) 10. (Y cannot accommodate a letter on its back as it is always wanted. Pairing 16 of the remaining 17 *judiciously*, we are left with an odd letter whose endorsement would serve no useful purpose.)

69. FIVE TRADERS

CORK sent wood to Beer, Wool sent cork to Pepper, Wood sent pepper to Wool, Beer sent wool to Wood, Pepper sent beer to Cork.

70. ALPHABETICAL

A = 7, B = 1, C = 5, D = 3.

2 and 5 cannot both be present as then C = 0.

If 5 is present it must be C, for any odd multiple of 5 ends in 5. If 2 is present it must be C, for any multiple of 2 must end in an even digit, and the only available even digit is 2.

∴ C is either 2 or 5, for there are only three more choices, 1, 3, 7. These must be assigned to A, B, D.

The only possible solution is 77175.

71. WHEN THE FROST COMES

$$-40°$$

72. A CRAZY RACE

$$
\begin{array}{cccc}
 & ut & P & vt \\
A & \rule{3cm}{0.4pt} & \rule{3cm}{0.4pt} & B
\end{array}
$$

(S's start)   (T's start)

Let u, v (yds./sec.) be speeds of S, T.

Let t sec. = time to P.

Then (times from P to finish)

$$\frac{ut}{v} = \frac{63}{5} \text{ and } \frac{vt}{u} = \frac{28}{5}$$

Whence $\quad \frac{u^2}{v^2} = \frac{9}{4}, \quad \frac{u}{v} = \frac{3}{2}$

$$\therefore \ AP = \frac{3}{5} \text{ of } 147 = 88\tfrac{1}{5} ;$$

$$BP = \frac{2}{5} \text{ of } 147 = 58\tfrac{2}{5} ;$$

Also $u = BP / \dfrac{28}{5} = 10\tfrac{1}{2} ; \quad v = 7$

$\therefore$ S's time $= \dfrac{147}{10\tfrac{1}{2}} = 14$ secs., T's $= 21$ secs.

$\therefore$ Points (T) $= 88\tfrac{1}{5} + 14 = 102\tfrac{1}{5}$
Points (S) $= 58\tfrac{2}{5} + 42 = 100\tfrac{2}{5}$

$\therefore$ T wins by $1\tfrac{2}{5}$ points.

73. DREKE MANOR

LET the gap, AB, be x yds. wide. Then the angle of vision from a point P on the path CP will be greatest when CP is a tangent to the circle through A,B,P.

$\therefore$ AC. CB $=$ CP^2
$(x + 50) \times 50 = 80^2$
$x = 78 ;$ i.e., gap
is 78 yds. wide·
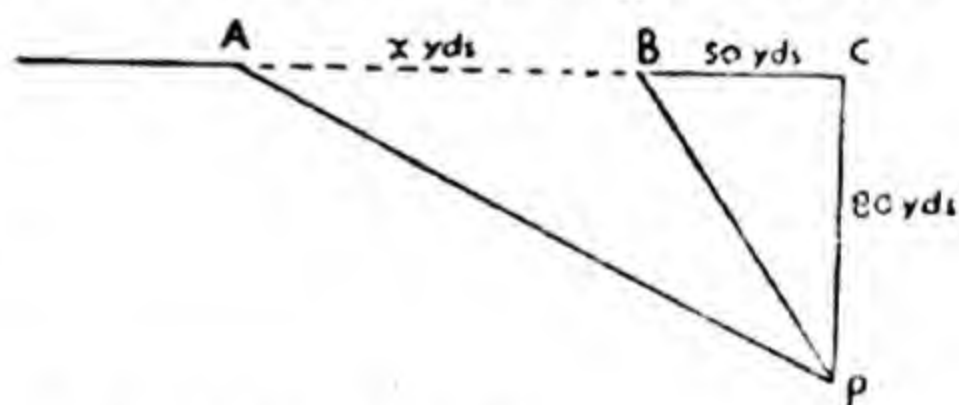
74. THREE-SPEED GEAR

LET x, $2x$, $3x$ m.p.h. be P's speeds.

Then $\quad \dfrac{1}{x} + \dfrac{1}{2x} + \dfrac{1}{3x} = \dfrac{3}{2x} + \dfrac{1}{10}$

giving $\quad x = \dfrac{10}{3}$

$\therefore$ Monday's time $= \dfrac{9}{20} + \dfrac{1}{10}$ hr.

$\qquad\qquad = 33$ minutes.

75. NINE DIGITS

$$6)\overline{195287346}$$
$$\overline{32547891}$$

76. NINETY-NINE

FATHER, 36; Mother, 40; William, 9; Peter, 4; Dora, 10.

(The detailed solution, complicated by the various ambiguities entailed by "difference," is too lengthy to be printed here.)

77. ROAD FRONTAGE

LET x, $x + 9$ ft. be the lengths of Wing's and Bing's frontages.

Then $1330 - (2x + 9)$, or $1321 - 2x$ ft. is the length of Ling's.

$\therefore (x + 9)^2 = (1321 - 2x)^2 + x^2$

$2x^2 - 2651x + 1330 \times 656 = 0$

which gives $x = 608$ or $717\frac{1}{2}$.

But the latter value is too large, making B's and W's together > 1330 ft.

$\therefore$ Wing's frontage is 608 feet.

78. A MIXED FOURSOME

LET P's age $= x$, J's $= y$, M's $= a$, B's $= b$

Then $\quad xy + ab = ax + by + 21$

$\qquad (x - b)(y - a) = 21$

Obviously $x - b = 7$, $y - a = 3$.

Now Peter can only be 13 or 12 (scholarship).

If 12, B's age is 5, J's 9, M's 6, which is too close to B's.

Peter is $\therefore$ 13 and Betty 6, which gives us John 11 and Michael 8.

[Even admitting 11 for Peter (schol. age at some

Secondary Schools) we get Betty 4 and Michael 4 (inadmissible).]

79. AQUATICS

(*a*) It fell. (*b*) While in the boat the iron was displacing (*per* the boat) its own weight of water, which was of greater volume than itself ; when it merely sank in the water, it displaced only its own volume.

80. CROSS-NUMBER PUZZLE

¹4	²1	³8	9	⁴2
⁵7	3	6	⁶2	1
⁷3	⁸4	⁹5	7	6
¹⁰9	¹¹3	9	¹²3	¹³5
¹⁴1	8	7	¹⁵2	4

6 *down* can at once be found (273), and 11 *across* is fairly obvious: $24 + 15 = 39$.

The personal touch in 2 *across* tells us that it begins 18 or 19; and since nos. of the form $n(n+1)$ can only end in 0, 2 or 6, and 6 cannot begin a three-digit cube, 2 *across* ends in 2, and can be seen at once to be 43×44, or 1892. 4 *down*, a cube, 2.., can only be 216. Since 8 and 9 are two digits of 3 *down*, the others must be 5, 6, 7, $\therefore$ 12 *across* is 35 and 7 *across* 34. 1 *down*, ending in 3, must be $\frac{1}{4}$ of 2 *across*, i.e., 473; and the rest is simple.

81. TANKS

512. (The most northerly has 486.)

82. SPOT THE POET

A—Milton, B—Pope, C—Keats, D—Gray.

83. A DIP INTO THE FUTURE

SINCE $\dfrac{17 + 9 + 29\frac{1}{4}}{29\frac{1}{4}} = \dfrac{17}{9}$, the Chanways form a harmonic pencil; therefore the range of Sunway crossings is harmonic. Hence, if the missing distance is x miles,

$$4(15 + 4 + x) = 15x,$$

which gives $x = 6\frac{10}{11}$.

i.e., the distance is 6 miles 1,600 yds.

84. FIREWORKS

As 445 pence have to be equally shared, there must be the 5 boys named, and no more.

Let a, b, c, d be the numbers of rockets, roman candles, squibs and crackers bought by any one boy. We get from the data $8b + c = 69 - 11a$. Giving a its possible values (from 1 to 5) and excluding lists barred by the narrative, we have:

	E	D	B	A	C
Rockets	1	2	4	4	5
R. Candles	7	5	2	3	1
Squibs	2	7	9	1	6
Crackers	10	6	5	12	8

(The initials, as subsequently discovered, are placed above the columns.)

So Bertram bought 9 squibs.

85. POTTER'S VIVA

1—20. 2—29. 3—17. 4—11. 5—Wednesday. 6—5. 7—11. 8—Only one, 1949.

86. STAMP COLLECTORS

ALARIC had 21, Basil 29, Cuthbert 31.

$$B + 11 = 2(C - 11)$$
$$2(A + 9) = 3(B - 9)$$
$$C + 8 = 3(A - 8)$$

giving the result A = 21, B = 29, C = 31.

87. MAGIC SQUARE

17	6	5	23	14
3	24	12	16	10
11	20	8	4	22
9	2	21	15	18
25	13	19	7	1

88. ICED CAKES AND ICES

SINCE 282 halfpence ($= 6 \times 47$) were spent, there must have been 6 persons; all must have had tea (to make an odd number, 47, of halfpence per head)

∴ 20d. each went on cakes and ices.

Possible partitions are:—

Ices	2	1	1	0	0	0	0
3d. Cakes	0	3	1	6	4	2	0
2d. Cakes	1	1	4	1	4	7	10

of which the last is inadmissible.

∴ 16 threepenny cakes were consumed, and 3s. was spent on ices.
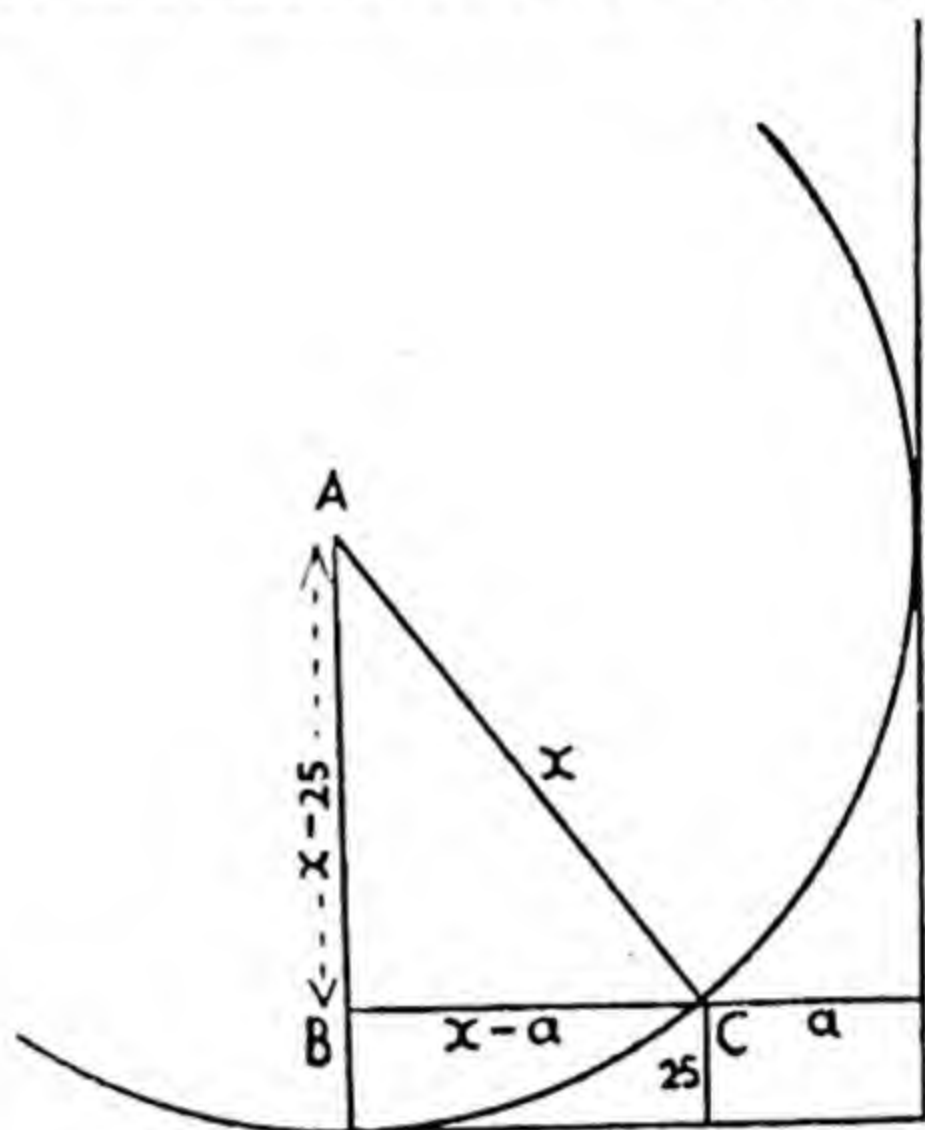
LET a yds. = length of unmeasured side of enclosure; let $2x$ yds. = length of one side of fence
  = diameter of outer track boundary

Then from the diagram we see
$$(x - a)^2 + (x - 25)^2 = x^2$$
which gives (taking the solution that applies to this figure)
$$x = a + 25 + 5\sqrt{2a}$$
Since $2x$ is an even number, x is integral
∴ a is integral, and $2a$ is a square number.
Now a lies between 25 and 50, and is therefore 32.
  ∴ $x = 97$.
That is, side of square is 194 yds. long.

90. FUEL

$$x = 2, \quad y = 17$$
$$(£2 \ 17s. \times 6 = £17 \ 2s.)$$

91. HUNTING THE U-BOAT

B., 9; C., 16; D., 12.

92. HOLIDAY WEATHER

Twelve days.

93. TWO PLANES

270 and 330 m.p.h.

94. A HAND AT CONTRACT

SOUTH takes the first trick with his Q and plays 3 more rounds of Diamonds, discarding A, K, Q of Clubs from Dummy. He then leads the 6 of Clubs, taken by Dummy's J, returns the 8, taken by the 9, leads the 10, discarding Dummy's K of Spades, and puts East in by leading the 2 of Clubs.

East is thus compelled to lead a Heart, Dummy taking the remaining five tricks.

95. KNITTING FOR VICTORY

LET B, R, W be the number of quarter-ounces required for one scarf.

$$\text{Then } 14 - B = 11 - R + 9 - W$$
$$R + W - B = 6$$
$$\text{and } R + W + B = 24$$
$$\therefore 2B = 18$$
$$B = 9$$

∴ she would need 9—5 more blue wool,
i.e., one ounce.

96. IN THE CONCENTRATION CAMP

SINCE $6425 = 917 \times 7 + 6$, if we think of the doors in sets of 7, in alternate directions, we see that 917 sets of 7 will be completed by an A to G set. The final 6, beginning at H, will take the counter to C—and liberty !

97. HOW GREEN WAS MY VALLEY ?

$$\tfrac{3}{4}G + \tfrac{1}{3}S = \tfrac{1}{4}G + \tfrac{2}{3}S$$
$$\tfrac{1}{2}G = \tfrac{1}{3}S$$
$$\frac{G}{S} = \frac{2}{3} \quad \text{i.e., } \frac{2}{5} \text{ was grassland.}$$

98. EGG SHARING

C's share is clearly the average of the 5, and is therefore 20 eggs.

99. A KNIGHT'S TOUR

THE completed tour yields this question :—

"*What are the ages of Jack and Jill? Jack is three times as old as Jill was when Jack was twice as old as Jill was when Jack was three times as old as Jill was when Jack was a year older than Jill will be when the sum of their ages is 32, and Jack is twice as old as Jill is now.*"

It is not difficult to discover that their present ages are 18 (Jack) and 10 (Jill).

100. SQUANDER-BUG RAMPANT

COMBINING the equation $x + y + z = 82$, with each of

(A) $x^2 + y^2 + z^2 = 2546$
(B) $x^2 + y^2 + z^2 = 2526$ in turn,
(C) $x^2 + y^2 + z^2 = 2326$

it will be found that the possible numbers of purchases for the three families are :—

	A	B	C
Father	41	37	34
Mother	24	31	27
Daughter	17	14	21

[The alternative for B of 41, 22, 19, satisfies conditions

as to totals, but is ruled out by other statements.]

The information "Mr. F. 10 more than Mrs. S,"
"Mrs. L 10 more than Jane," and "Mr. S. spent 4 times
as much as Ann,"

identifies A as Lynes

           B as Fiennes

           C as Signs

           Jane as Fiennes (B)

           Ann as Lynes (A)

∴ Mary is Miss Signs (C), and her expenditure is
441d., or £1 16s. 9d.

01. HUNTIN' AND SHOOTIN'

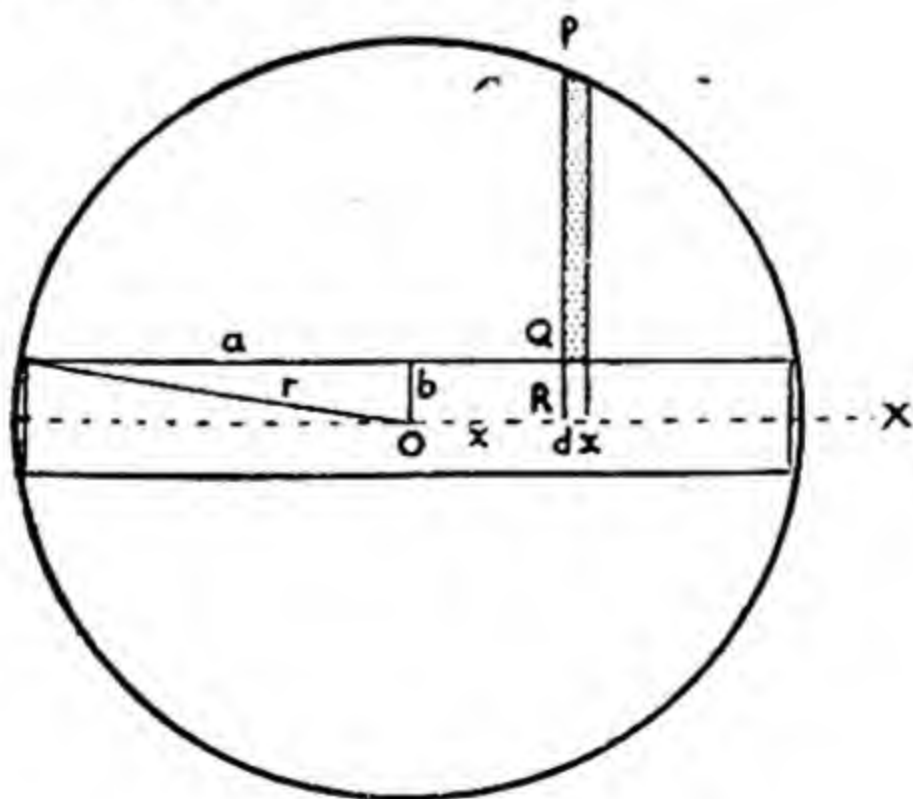Out of x officers $\dfrac{x}{3} - \dfrac{x}{6}\left(= \dfrac{x}{6}\right)$ hunt only

$$\dfrac{x}{2} - \dfrac{x}{6}\left(= \dfrac{x}{3}\right) \text{ shoot only}$$

$$\therefore\ x = \dfrac{x}{6} + \dfrac{x}{3} + \dfrac{x}{6} + 10$$

$x = 30.$ That is, there were 30 officers.

102. A THOROUGH-GOING CHEESE-TASTER

Diagram of a central section.

Length of hole $= 2a$
Radius of hole $= b$
Radius of cheese $= r$

From diagram,
$QR^2 = b^2 = r^2 - a^2$
$PR^2 = OP^2 - OR^2$
$= r^2 - x^2$

$$\text{Vol. remaining} = \int_{-a}^{a} \pi PR^2 dx - \int_{-a}^{a} \pi QR^2 dx$$

$$= \pi \int_{-a}^{a} (r^2 - x^2 - r^2 + a^2)\, dx$$

$$= \pi \int_{-a}^{a} (a^2 - x^2)\, dx = \frac{4\pi a^3}{3}$$

(which is independent of size of cheese).

That is, vol. required $= \dfrac{4 \times 22 \times 21^3}{3 \times 7 \times 8^3}$ (approx.)

$$= 75 \cdot 8 \text{ cu. in. (approx.)}$$

103. GAELIC GUILE

ROBINSON had to pay 19s.

Before drawing any diagonals there is one compartment; each completion of a diagonal and every intersection with another will add a compartment.

∴ if D = No. of diagonals
  I = No. of intersections
  C = No. of compartments
C = I + D + 1   ∴ C — I = D + 1
So in this case D = 152, and if the figure has *n* sides,

$$D = \frac{n(n-3)}{2} = 152$$

whence $n = 19$

The professor, having merely to work out this last equation, was betting (as usual) on a certainty.

124

104. BUS SPEED

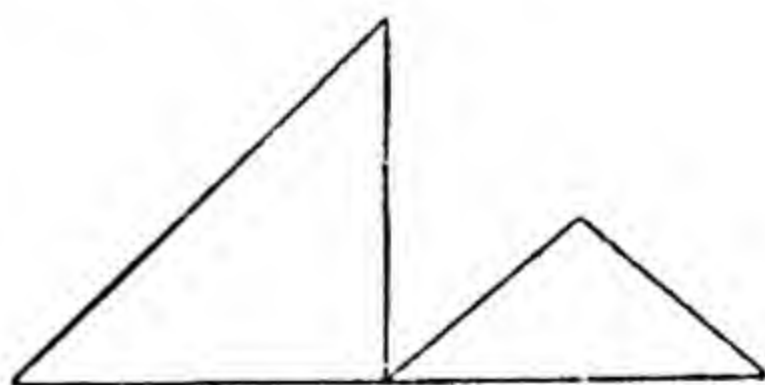Eighteen miles per hour.

105. WE WANT EIGHT
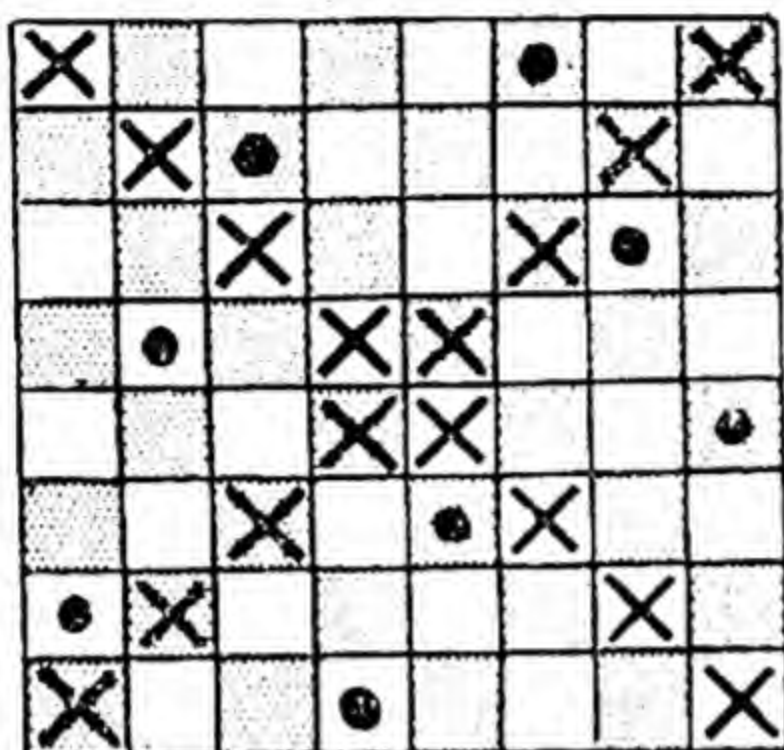
106. PROGRESS

16 inches: half circumference (44 in.) — diameter (28 in.)

107. ALLOTMENTS
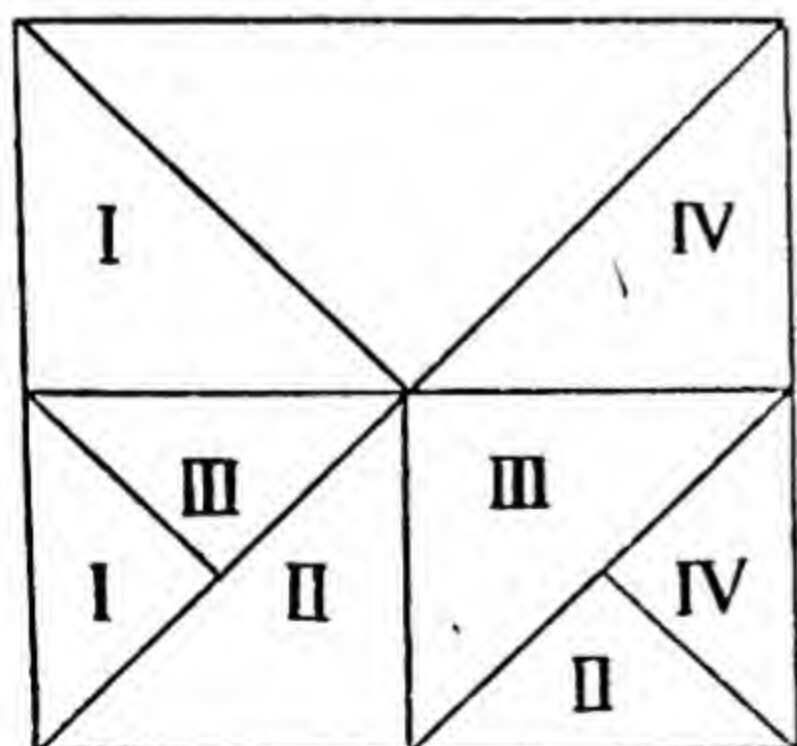
EACH allotment has the shape :

and has a boundary $150 + 100\sqrt{2}$ yds. long. Smith's triangle has a boundary of $100 + 100\sqrt{2}$ yds.; so the difference is 50 yds.

108. CROSS-NUMBER PUZZLE

5	2	8	5	2	9
2	7		7	2	7
9	9			2	
		5	7	2	1
	6	2	9		0
2	2	8		3	1

NOTES:

8 *across.* "Say 99"

9 *across.* Northants *v.* Gloucester, 1907.

109. COINS

H + S + P = 30.
30H + 12S + P = 376
[Mod. 6] P ≡ 4 ∴ P = 4 or 10
P = 4 leads to impossibilities, ∴ P = 10
∴ H + S = 20
30H + 12S = 366
whence H = 7, S = 13
i.e., 7 half-crowns, 13 shillings and 10 pence.

110. LINERS

(*a*) After 72 days, (*b*) never.

111. POTTER'S INTELLIGENCE TESTS

1. 24.
2. 165 yds.
3. None.
4. (*a*) 57; (*b*) 0.
5. A penny.
6. $4\frac{1}{2}$ stone.
7. Nephew: John is my sister's son.

112. REFLECTED TIME

JUST after 38 minutes past 7 ($7.38\frac{2}{11}$, to be exact).

113. TILES

403. (The dimensions of maximum tile = 17 in. × 17 in.)

114. DESERT TACTICS

DENOTING places by initials; produce BS to meet ZM at A.   AM = BM = 43 ∴ ZA = 21.
Now the triangles ZAS, ZKM are similar :
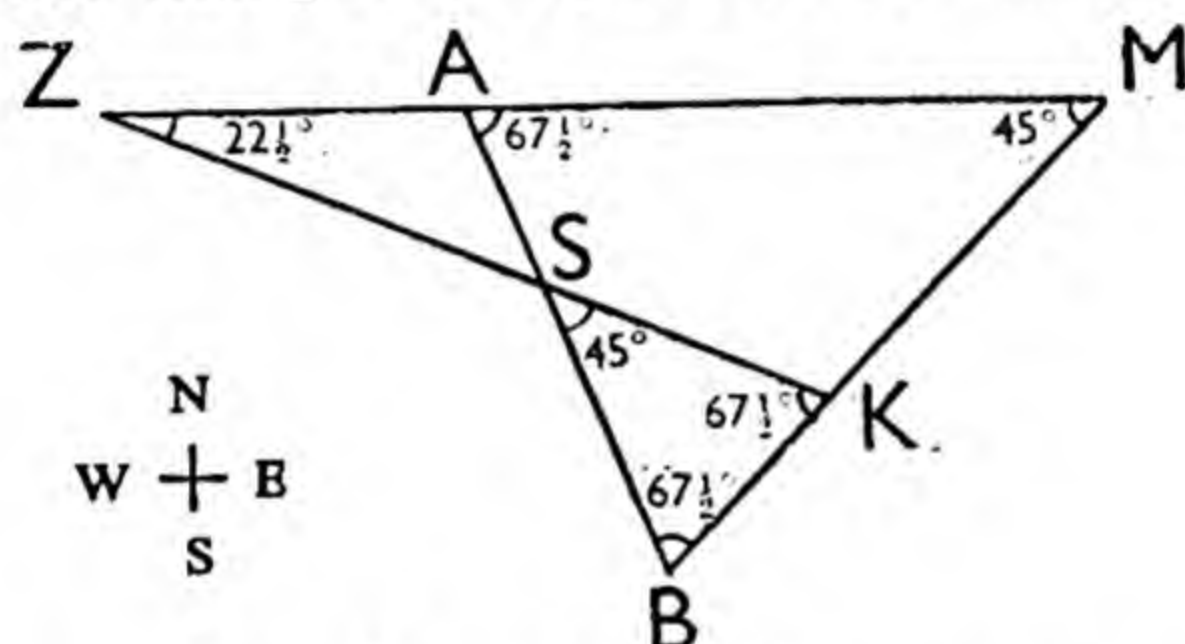
$$\therefore \text{ZS} = \frac{\text{ZM. ZA}}{\text{ZK}} = \frac{64 \times 21}{49} = 27.43 \text{ miles.}$$

115. HOW OLD ?

23, 29, 35, 37, 41.

116. HOUSING ACCOMMODATION

IN any road, let there be x odd numbers, and y even numbers.
Then $1 + 3 + \ldots$ to x terms $= x^2$, and $2 + 4 + \cdots$ to y terms $= y(y + 1)$
∴ $y(y + 1) = x^2 - 43$, whence
$$y = \frac{-1 \pm \sqrt{4x^2 - 171}}{2}$$

$\therefore 4x^2 - 171 =$ a square $= k^2$, say, where k is integral.

Then $4x^2 - k^2 = 171 = 3.3.19$

$$2x - k = \quad 1, \quad 3, \quad 9$$
$$2x + k = 171, \ 57, \ 19$$
$$4x = 172, \ 60, \ 28$$
$$x = \quad 43, \ 15, \ 7$$
and $\quad y = \quad 42, \ 13, \ 2$

Therefore A has 43 odd and 42 even = 85 houses.

B has 15 odd and 13 even = 28 houses.

C has 7 odd and 2 even = 9 houses.

117. MAIMED SCALES OF NOTATION

IF Mbombo had m fingers, and Njinga, n

$$2m^2 + m + 5 = 3n^2 + 4n + 1$$
$$m(2m + 1) = (3n - 2)(n + 2)$$

Now $n > 4$ $\therefore$ $3n - 2 > 10$; and since $n < 10$, $3n - 2 < 28$.

Also $m > 5$ and < 10 $\therefore$ $2m + 1 > 11$ and < 21.

Tabulating possible cases:

n	9	8	7	6	5
$3n - 2$	25	22	19	16	13
$n + 2$	11	10	9	8	7

$m(2m+1)$	11×25	10×22	9×19	8×16	7×13
m	imposs	imposs	9	imposs	7 (and $2m+1$ $=13$, imposs)

$\therefore$ $m = 9$, $n = 7$. And the No. is 176.

118. OVER-DOUGHING THE DOUGHBOY

14 dollars 32 cents.

119. BATLEY'S AVERAGE

SINCE his average for the match was 31, his season's average remained unchanged. Therefore after the first innings his average was 29.
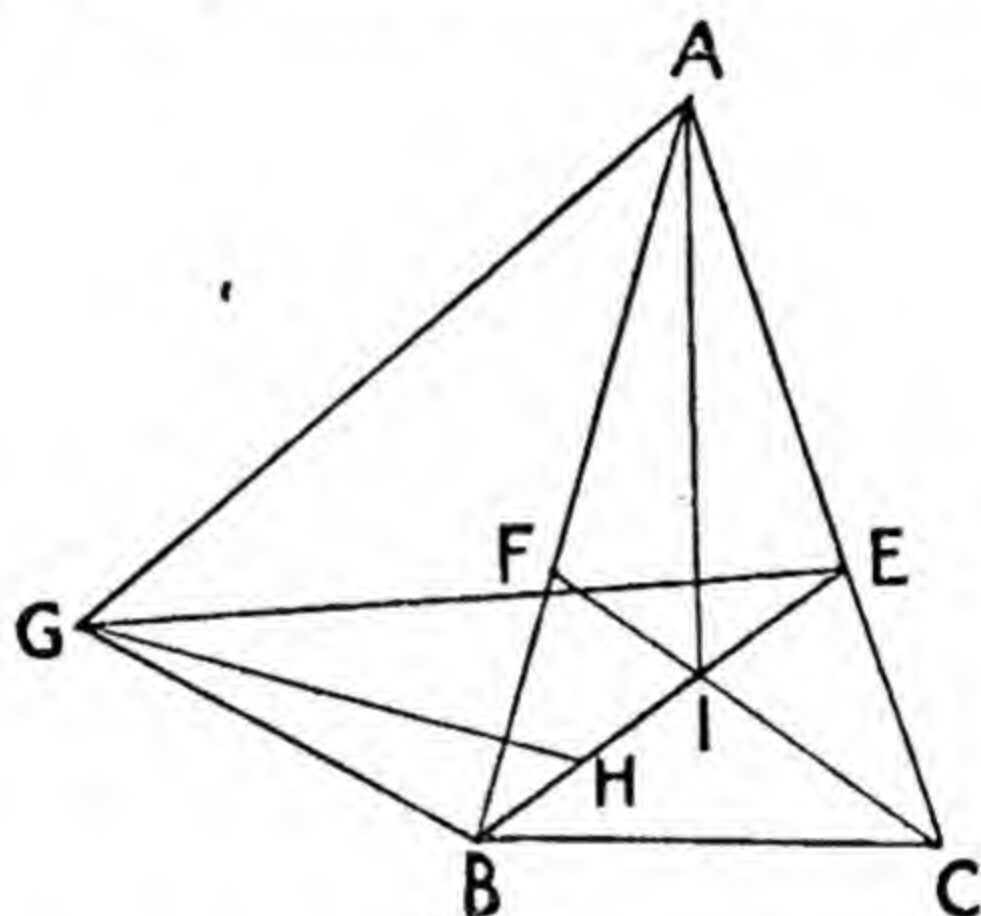
If he played x innings altogether,
$$31x = 29(x - 1) + 55$$
$$2x = 26$$
$$x = 13$$

120. A GEOMETRICAL DOODLEBUG

ON BE describe a triangle GBE, congruent with AFC. Let the bisector of the angle G meet BE in H. Join I, the intersection of BE and CF, to A. Then IA bisets $\hat{A}$. Join AG.

Since $B\hat{G}E = \hat{A}$, B, G, A, E are concyclic.

$\therefore A\hat{B}E = A\hat{G}E$

$\therefore AIE (= A\hat{B}I + B\hat{A}I) = A\hat{G}E + \dfrac{A}{2} = A\hat{G}E + \dfrac{B\hat{G}E}{2}$

$= A\hat{G}H$

$\therefore$ A, G, H, I are concyclic.

129

But GH = AI (bisectors of corr. angles in two congr. triangles)

∴ AG is parallel to HI.

Then $\dfrac{C}{2}$ = B$\hat{\text{E}}$G = A$\hat{\text{G}}$E (alternate)

$\qquad\qquad$ = A$\hat{\text{B}}$E = $\dfrac{B}{2}$

∴ C = B, ∴ ABC is isosceles.

WORD AND LETTER PROBLEMS

121. STOP THE GAPS

1. STOCKPORT, BEER.
2. CLAPHAM, BAKEWELL, BURNHAM, CHARD, ETON.
3. WOORE, WOOL, BARKING.
4. BACUP, EYAM, GNOSALL, COWES, IDLE, SHERE, HAVANT.
5. HYDE, FLEETWOOD, BATTLE.

122. GENERAL KNOWLEDGE TEST

$$39 - (12 + 3 + 7 + 3 + 1) = (10 \times 4) - (3 \times 9)$$
$$39 - 26 = 40 - 27$$
$$13 = 13$$

123. FOUR CONSONANTS

Across : SCHISM, ECHOES.
Down : SCHEME, MAMMAS.

124. FIND THE GENERAL

A sphy	X iate	D
L eg	A te	E
E de	N so	R

125. LITERARY NUMERALS

1. Five   (*The Tempest*)
2. Seven.   (*As You Like It*)
3. Six.   (*Intimations of Immortality*)
4. Ten.   (*Daffodils*)
5. Three.   (*Education of Nature*)

6. Eight.   (*Midsummer Night's Dream*)
7. Nine.   (*Macbeth*)
8. Two.   (*England and Switzerland*)
9. One.   (*Reverie of Poor Susan*)
10. Four.   (*Henry IV, Part I*)

126. MIDDLES

1. PACHYDERM.   2. NICKNAME.   3. FUCHSIA.   4. QUEUEING.
5. KINKAJOU. 6. APOPHTHEGM. 7. KNAPWEED. 8. SUBPOENA.
9. TALISMAN.   10. WITHHOLD.

127. TWO SMART GIRLS

```
N  O  M  A  D
S  A  T  I  N
O  U  N  C  E
S  A  U  C  E
H  O  B  B  Y
```

128. CONTRACTING WORDS

COUNTERPOISE
PERSECUTION
SUPERTONIC
COUNTRIES
TROUNCES
COUNTER
CORNET
TENOR
TONE
NOT
NO
O

129. WORD SQUARE

```
P  A  S  T  O  R
A  T  T  I  R  E
S  T  U  P  I  D
T  I  P  T  O  E
O  R  I  O  L  E
R  E  D  E  E  M
```

130. FIND THE TOWNS

1. WHIT-STABL-E
2. PA-IGNTO-N
3. C-AMELF-ORD
4. CA-MBRI-DGE
5. S-IDM-OUTH
6. LE-ICEST-ER

131. SHUFFLED LETTERS

1. EDUCATION, CAUTIONED.
2. RE-READING, GRENADIER.
3. ORGANISED, GRANDIOSE.
4. MECHANICS, MISCHANCE.

132. LITERARY JIGSAW

Across : BUNYAN, CONAN DOYLE, EMLYN WILLIAMS, DU MAURIER, OUIDA, JEROME, MILNE, MARIE CORELLI, LLEWELLYN, TOP-LADY.

Down : BERNARD SHAW, NOEL COWARD, EDGAR WALLACE, SABATINI, SMOLLETT, DUMAS, KIPLING, TROLLOPE, DE QUINCEY, DARWIN, BLACKMORE, MITCHELL, BUCHAN, LAMB, ORCZY, ELIOT, IAN HAY, DEFOE, GAY.

133. IN REVERSE

1. ARISE, RAISE.
2. SOLO, OSLO.
3. PAPAL, APPAL.
4. USE, SUE.
5. ARREST, RAREST.
6. LATITUDES, ALTITUDES.

134. SHAKESPEARE CHARACTERS

1. ALONSO, MIRANDA.
2. CASCA, PORTIA.
3. OLIVER, CELIA.
4. EROS, CHARMIAN.
5. EDMUND, REGAN.

135. WORD CHAIN

```
T   A   M   I   L
I   L   I   A   D
A   D   D   L   E
L   E   D   G   E
G   E   L   I   D
I   D   E   A   L
```

136. SHUFFLED LETTERS

1. RESTED, DESERT, DETERS.
2. PATER, TAPER, PRATE.
3. AIDES, ASIDE, IDEAS.

137. SPURIOUS WORKS

1. Hardy, *The Dynasts.*
2. Masefield, *Cargoes.*
3. Tennyson, *Maud.*
4. Shaw, *Pygmalion.*
5. Kingsley, *Westward Ho!*
6. Thackeray, *Henry Esmond.*

138. LITERARY RIVERS

1. WESER (Browning, *Pied Piper*).
2. ISER (Campbell, *Hohenlinden*).
3. ALPH (Coleridge, *Kubla Khan*).
4. HEBRUS (Milton, *Lycidas*).
5. FORTH (Lady Nairne, *Caller Herrin'*).

139. FORE AND AFT

1. INGOING.
2. RESTORES.
3. IONIZATION.
4. ENTICEMENT.
5. ANTICIPANT.
6. REDELIVERED.

140. WORD LADDER

If you accept COOES or BOCKS, it can be done. For instance, PAPER, CAPER, CAPES, COPES, COOES, COOKS, BOOKS.

[*Cooes* is a spelling found in English Literature, and *bocks* has come into popular usage.]

141. SCRIPTURAL NUMBERS

$$1000+318+3+6+4=450+600+120+148+8+5$$
$$1331 \ = \ 1331$$

[*References*: Judges, xv, 15; Genesis, xiv, 14; Exodus, ii, 2; Ruth, iii, 15; Revelation, iv, 6; 1 Kings, xviii, 19; Exodus, xiv, 7; Deuteronomy, xxxiv, 7; Nehemiah, vii, 44; Acts, ix, 33; Luke, xii, 6.]

142. FIND THE NOVELIST

CHARLES DICKENS.
1. she, lack, cinders.
2. cakes, children's.
3. chickens, are, £ s. d.

143. MAINLY ZOOLOGICAL

Across : 1. BOA. 3. PIG. 5. NEVER FORGETS. 9. GLUM. 10. DROMEDARIES.
Down : 2. ASS. 3. PUG. 4. GNU. 6. EMIR. 7. EXAM. 8. TASSEL. 10. DO. 11. OWL. 12. IMP.

144. LINKED WORDS

KETTERING, INTEGRATE, REINSTATE, IN-STANTER, RESTRAINT, TRANSIENT.

145. HIDDEN NAMES

1. EDGAR, TOM. 2. ESTHER, GRACE. 3. ADA, AMY. 4. ARTHUR. 5. WILLIAM. 6. EDWARD. 7. GEORGE.

146. LOOK AGAIN

40.

147. TRUTH TEST

B was a tree-man, C a cave-man. If A was a cave-man he would answer truthfully, and if he was a tree-man he would answer untruthfully, so that in either case he must have said, "I am a cave-man."

∴ B's statement must be false, and C's statement must be truthful.

148. MR. AND MRS. SPRAT

Keyword: THRENODIAL.

Jack Sprat, dear reader, had a tender interior and hated lard but adored lean. His ideal wife had no teeth and loathed lean ; so the entire dinner ration was annihilated.

149. LITERARY JIGSAW

Across : LORNA DOONE, CLAYHANGER, KIPPS, ADAM BEDE.
Down : A LAODICEAN, CAVALCADE, MACBETH, KIM, KIDNAPPED, JANE EYRE, SHE.

150. ALPHABETICAL

MANY arrangements are possible. Here is a sample, with familiar words: SAMPLE, JUNIOR, PACKET, SEXTON, QUAINT, EFFIGY, ZEALOT, NEARLY, HAMMER, WINTRY, AFRAID, VIOLET, BEHOLD.

151. PROTRACTED WORDS

1. TOOTHACHE.
2. CONCENTRATE.
3. INDUSTRIOUS.
4. UNDERGROUND.
5. TUMULTUOUSLY.
6. TOTALITARIANISM.

152. ALPHABETICAL CROSSWORD

Across : CLOG, FEZ, PAW, SQUIB.
Down : DOT, VEX, MARSHY, JUNK.

153. EXPANDING WORDS

A, AS, SEA, SAGE, GEARS, RANGES, STRANGE, SERGEANT, GREATNESS. (Slight variants are possible.)

154. WHICH ?

1. RAKE. 2. FORK. 3. SIGH. 4. NERVE, BRANCH.
5. BALANCE. 6. RIP. 7. COMPLETE. 8. TEAR.
9. UTTER.

155. CAPITAL

LISBON, DUBLIN, MADRID, MOSCOW, WARSAW, BERLIN, LONDON.

156. THE LADY OF RIGA

Keyword : NORMALISED.

A DAMSEL in India desired to roam on a lioness—an odd idea, rare even in senseless modern maidens. One morn the lassie saddles the animal and sallies forth. The ride ended at noon, mademoiselle inside, and a serene smile on the lion's dial.

157. WORD LADDERS

1. SOLO, SOLE, DOLE, DOLL, DULL, DUEL, DUET.
2. FOUR, FOUL, FOOL, FOOD, FORD, FORE, FIRE, FIVE.

158. CHRISTMAS JIGSAW

1. TIM. 2. MUSIC. 3. SANTA CLAUS. 4. CAKE.
5. STEPHEN. 6. WENCESLAS. 7. NICHOLAS.
8. DICKENS. 9. KISS. 10. TURKEY. 11. YULE.

159. CANCEL OUT

1. OWL, MOLE.
2. DOVE, DEER.
3. COOT, STOAT.
4. EAGLE, STAG.
5. GUAN, GNU.
6. GROUSE, HORSE.
7. PARROT, PANTHER.
8. PELICAN, LEOPARD.

160. PLENTY OF FISH

BREAM, TUNNY, SOLE, SHAD, PLAICE.

161. QUICK CROSSWORD

Across : 1. PEG. 4. EAR. 5. GRAFT. 8. FUR.
9. TRACT. 12. COO. 13. TOW.
Down : 1. PEG. 2. EAR. 3. GRAFT. 6. FUR.
7. TRACT. 10. COO. 11. TOW.

162. CHOOSE EIGHT TOWNS

1. CAMBRIDGE.
2. CARDIFF, DARLINGTON.
3. ETON, NUNEATON.
4. REDCAR, DEAL, HAVERFORDWEST.

163. GATE-CRASHERS

1. RIKKI-TIKKI-TAVI. 2. CUTTLE. 3. MR. BAD-
MAN. 4. GARGANTUA. 5. SIR PETER TEAZLE.
6. ANN VERONICA. 7. CAPTAIN MACHEATH.
8. WEE WILLIE WINKIE. 9. MRS. BARDELL.
10. BARDOLPH. 11. FIBBY WINKS. 12. POLLY
PEACHUM.

164. PICK A POSY

ASTER+hold; ROSE+stem; PINK+greed;
ORCHID+wit; IRIS+fenland.

165. GEOGRAPHY WITHOUT TEARS

SWANSEA, SWANAGE; BARMOUTH, YAR-
MOUTH; BRIGHTON, WORTHING; COWES,
SCONE; WINDSOR, SWINDON; LEITH, ERITH;
LOUTH, LUTON; LEEDS, LEWES; RYE, ELY;
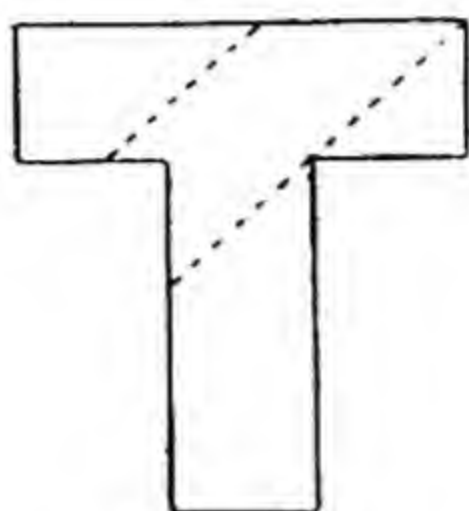AYR, HAY; HENLEY, NETLEY; STOKE, KELSO;
LEEK, PEEL.

166. SIX BEASTS

Down : MOOSE, TAPIR, HYENA.
Up : LEMUR, PANDA, HORSE.

167. TO A "T"

168. WORD SQUARE IN FRAGMENTS

```
N E S T L E S    (set+lens)
E N T R A N T    (net+tarn)
S T R A N G E    (nag+rest)
T R A I T O R    (art+trio)
L A N T E R N    (ran+lent)
E N G O R G E    (ere+gong)
S T E R N E R    (err+sent)
```

169. CRYPTIC QUOTATION

DISCARD and keep letters on the principle 1, 2, 1, 2 (Scotland Yard). Dropping one, keeping one, dropping two, keeping two, ABRAMJEDD, etc., becomes BMJD, etc. Applying the key 1, 2, 3 (waltz-time) alphabetically, we get

COME INTO THE GARDEN, MAUD.

170. CANS AND TINS

CANTALOUP, SCANTLING, DECANTERS, BUCCANEER, TOXICANTS, HURRICANE, DOMINICAN.
TINCTURES, ITINERANT, SATINETTE, CONTINENT, MATUTINAL, LIBERTINE, RINTINTIN.

171. TOWNS AND CITIES

STABLE	+	F	=	BELFAST
BRINE	+	L	=	BERLIN
TROOP	+	O	=	OPORTO
ROUT	+	R	=	TRURO
GARBLED	+	E	=	BELGRADE
HATES	+	N	=	ATHENS
WERE	+	C	=	CREWE
PLANS	+	E	=	NAPLES

172. RINGING THE CHANGES

RELATING, GELATINE, ALTERING, TERMINAL, INTEGRAL, LEARNING, TRIANGLE.

173. ANAGRAMMATIC

ROBERT LOUIS STEVENSON
(bores no true novelists)
AN INLAND VOYAGE (Gone, lad, any vain).
THE MASTER OF BALLANTRAE (all a matter of banter, he's).
CATRIONA (to air, can).
VIRGINIBUS PUERISQUE (is up, quivering, busier).
PRINCE OTTO (trice on top).
TREASURE ISLAND (alter and is sure).
WEIR OF HERMISTON (note wiser for him).
THE BLACK ARROW (chart, able work).

174. NUMERICAL QUATRAIN

Key phrase : GORY ASCENT

(Eros casts eyes on Grace or Rose, etc.).

DOUBLE ACROSTICS

175.
1. S   eldo   M
2. W   attea U
3. I   bi   S
4. N   aaf   I
5. G   arli   C

176.
1. S   ty   M(ie)
2. C leopatr A
3. H   iatu   S
4. O   utpu   T
5. O   rat   E
6. L   athe   R

1. *i.e.* added.
5. *prate.*

177.
1. T   ro   W
2. R   av   I
3. A ndama N
4. D   uncia D
5. E   xces S

2. Tributary of the Indus.
3. "and a man."

178.
1. G   oneri L
2. I   mag   I(nation)
3. A   me   N
4. N   onag   E
5. T   eno   R

Proem. *Integral in*—anagram.
1. "King Lear."

179.
1. E   xploi   T
2. V ermicell I
3. E   men   D
4. N   owher E

1. Verb and noun.
3. Includes "men."

180. 1. N   ostru   M   Proem. "to chasm"—
      2. I ntelligentsi A   disordered *stomach.*
      3. G   roce   R
      4. H ermitage   E
      5. T   erminu   S

181. 1. D   rawe   R   1. *Reward*
      2. I   rr   I (gate)   reversed.
      3. E mphati   C   4. Anagram.
      4. T elegrap H

182.   1. T   opi   C
               2. H   ai   L
               3. I nchcap   E
               4. C   amer   A
               5. K   eepe   R

183. 1. R   iffraf   F
      2. O   ratori   O
      3. A nemomete R   3. Anagram.
      4. R   etrea   T
      5. I   nval   I(date)
      6. N   av   E
      7. G   las   S

184.   1. P lesiosauru S
              2. E   xpos   I(tory)
              3. R   anda   N
              4. U   nclo   G

TRIPLE ACROSTIC

185. 1. E ncycl O paedi A
      2. L   e   A   k   S   2. Anagram of
      3. M aw   K   is   H   *lakes.*

143

QUIZ

186. 1. Co. 2. Superman. 3. Fairies. 4. Son. 5. Mr. Lewisham. 6. Grizel. 7. Rustum. 8. All That.

187. 45 (5, 8, 12, 20).

188. 1. Cromwell (of the great mace of Parliament).
2. George II (when told that General Wolfe was mad).
3. Queen Elizabeth (to the troops at Tilbury, time of the Spanish Armada).
4. The Younger Pitt (after Napoleon's victory at Austerlitz, 1805).
5. Canning (on his recognition of revolted colonies in South America, 1826).

189. 7 grandchildren; total sum, £49,000.

190. Mineral: Dolomite, Lazulite, Aerolite, Bauxite. Animal: Termite, Buchmanite, Tishbite, Stylite.

191. $17\frac{1}{2}$ miles.

192. 1. Power to escape from bonds. 2. Powerful voice. 3. Swimming. 4. Chastity. 5. Skill in music. 6. Wisdom (through age). 7. Juggling. 8. Power of changing his form. 9. Acrobatic balancing. 10. Speed in running.

193.

IMPERSONAL

931675	931675
9355	1643
922320	933318

194. 1. *weigh* should be *way*.
2. The cabin-boy's absence from the scene would constitute an alibi—not his lack of a knife.
   3. *inditement* should be *indictment*.

195. 6, 3, 4, 2, 7, 0, 5, 8. (Gross income—£634.)

196. Perfumes: attar, civet. Narcotics: lotus, chang. Fermented liquors: koumiss, saké. Food dishes: lobscouse, salmagundi.

197. Six to one.

198. B.

199. 66 lb.

200. He has to assess the assets of his sister's estate.

201. 63.

202. Insulin.

203. Place 5 in the centre, and the remaining digits on the circumference in the following order: 1, 2, 3, 4, 9, 8, 7, 6.

204. 1. Tom, the piper's son. 2. The Jackdaw of Rheims. 3. Paris, the Trojan prince. 4. The Knave of Hearts. 5. Jessica, Shylock's daughter. 6. Prometheus.

205. 16.

206. Hats off to the R.A.F.

207. 32.

208. 2, 4, 2, 2, 0.

209. Impossible—without a magic carpet! He cannot average a mile a minute because he has already taken a minute for the first half mile.

210. 1. Tiffin (not a drink).
2. Marten (not a bird).
3. Sunderlands (flying *boats*).
4. Merrie England (not by Gilbert and Sullivan).
5. Oboe (not a stringed instrument).
6. Discobolus (not a horse).
7. Curricle (not a boat).
8. Liliputian (not a giant).
9. 23 (the only prime number).
10. Hezekiah (not a book in the Bible).

211. He lost 11s. 6¾d.

212. Blue, Black, Scarlet, Black, White, Golden.

213. 10.

214. When in doubt, some indifferent players incline to indulge recklessly in bids which indicate sheer incompetence.

215. 1. Arson, parson.   2. chid, orchid.   3. epic, depicted. 4. colon, colonel. 5. urge, surgery. 6. raged, tragedy.

216. 9-15.

217. Lark, kiwi, ibis, smew, wagtail, linnet, tit, thrush, hoopoe, egret, teal.

218. Alfred has £45, Bertram has £37 10s., Colin has £22 10s.

219. Herbert George Wells, Horatio Nelson, William Ewart Gladstone, Samuel Pepys, Ben Jonson, Joseph Lister, Percy Bysshe Shelley, Theodore Roosevelt, James Matthew Barrie, Washington Irving, Thomas Alva Edison.

220. 9¾ secs.

221. Llandudno, Northampton, Ongar, Arundel, Ely, Lyndhurst, Stoke.

222. No; Jones should give Brown 52 in a 100.
$$\left(\frac{J}{R} = \frac{10}{8}, \quad \frac{R}{B} = \frac{10}{6}, \quad \therefore \quad \frac{J}{B} = \frac{100}{48} \right)$$

223. *Across :* item, time, emit.
Down : mite, Tim, semi, met.

224.
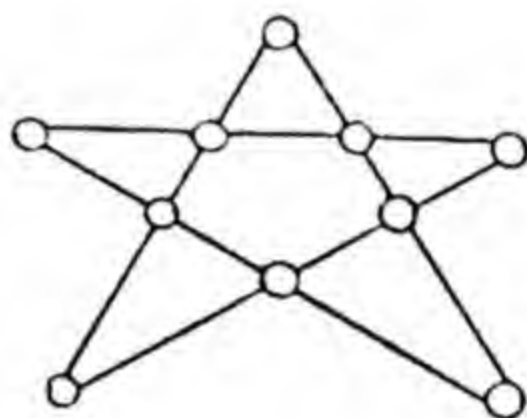
225. 1. All is not gold that glitters.
2. A rolling stone gathers no moss.
3. It's a long lane that has no turning.
4. Even a worm will turn.

226. She has not got her new hat.

227. From inside information we infer that in Aberdeen the inhabitants are intent on increasing their incomes.

228.

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B O X
C A R D
H O L L Y
T U R K E Y
P U D D I N G
S T O C K I N G
P A N T O M I M E
```

229. 1. strength. 2. facetious, abstemious. 3. deified, reviver, repaper. 4. eerie, cooee. 5. senselessness. 6. barefaced. 7. Caucasus.

230. Shame at her own folly made her shy.

A boot, hitting the singer, spoilt the rendering of the song "Until."

The enemy's retreat was cut off.

The breast stroke was used by the boy who swam the river Wear.

Nothing but your bowler hat, football boots and spats were left in the room.

Where the devil is, it should, I say, be against your principles to linger.

In the monkey-house you can hear the monkeys.

Singing "Pack up your troubles," the soldiers trudged along.

My aunt from America arrived to-day only.

Wrapt in contemplation, the nurse did not hear the baby crying.

"You can pay by instalments," said the man at the door.

Of our parish church our vicar is very proud.
To take my wife to the theatre is a pleasure.
I don't like walking in the dark.
Criminals sometimes make good.
Sausage meat is used for stuffing.
Elephants never forget.
To read the newspapers daily is useful.
To learn the truth about yourself you have only to ask.
A policeman who took bribes was dismissed.
The force of habit is behind most of our actions.
To keep our eyes in good condition we should bathe them.
With boiling, water quickly evaporates.

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*   *   *

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